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The Marine Observer

A quarterly journal of Maritime Meteorology

Volume XXXVIII No. 222

October 1968

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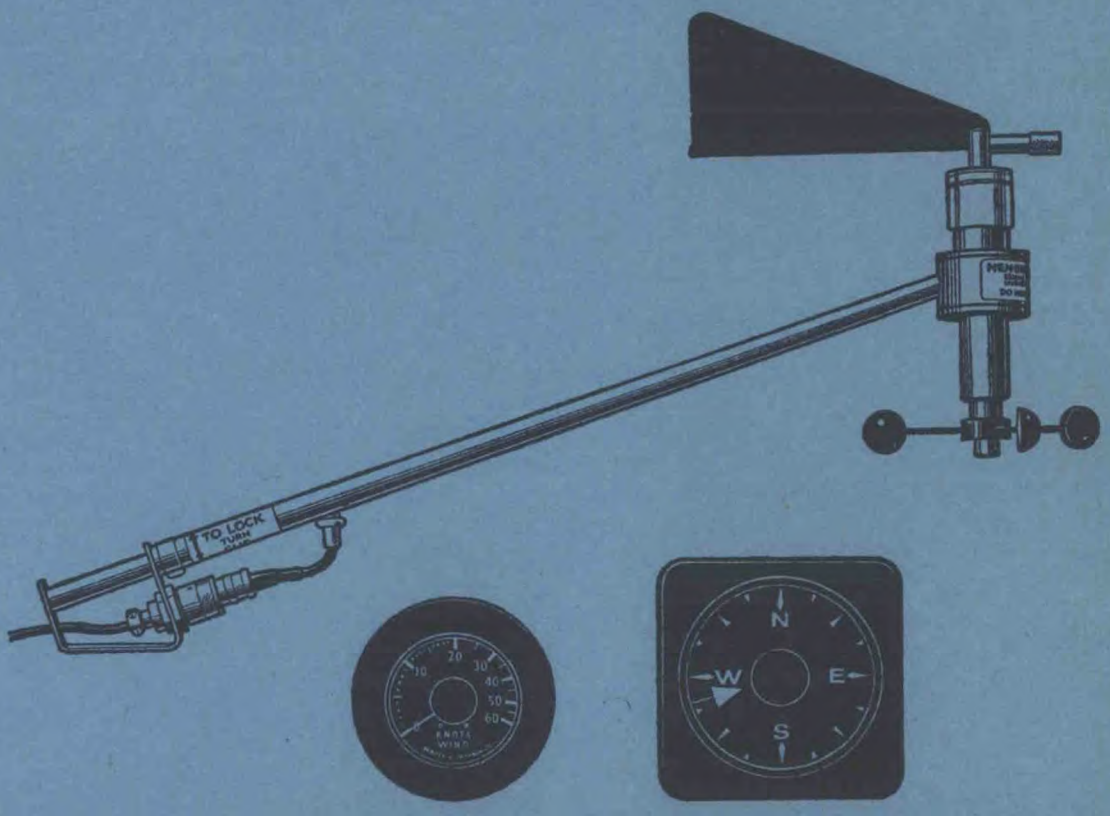

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THE MARINE OBSERVER

A QUARTERLY JOURNAL OF MARITIME METEOROLOGY PREPARED BY THE MARINE DIVISION OF THE METEOROLOGICAL OFFICE

VOL. XXXVIII No. 222 OCTOBER 1968

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Letters to the Editor, and books for review, should be sent to the Editor, "The Marine Observer," Meteorological Office, Eastern Road, Bracknell, Berkshire

Published for the Meteorological Office by
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That it should become so is the very last thing that we would wish, for there is literally no weather which is unworthy of being recorded and no shipping route, however widely used, which is adequately covered, meteorologically speaking.

October, November, December

The Marine Observers' Log is a quarterly selection of observations of interest and value. The observations are derived from the logbooks of marine observers and from individual manuscripts. Responsibility for each observation rests with the contributor.

Observing officers are reminded that preserved samples of discoloured water, luminescent water, etc. considerably enhance the value of such an observation. Port Meteorological Officers in the U.K. will supply bottles, preservative and instructions on request.

WATERSPOUTS

North Atlantic Ocean

m.v. *Geestport*. Captain A. MacNeil. Caribbean Sea to Barry. Observer, Mr. R. E. Baker, 3rd Officer.

13th November 1967. During a period of rain squalls, a disturbance on the water was seen at 1440 GMT, about 200 yd away. It took the form of a circular wall of spray about 10–15 ft in height, and 30–40 ft in diameter. It was revolving very quickly in a counter-clockwise direction, with a forward movement of about 15 kt and crossed the vessel's course line about 100 yd ahead. The water inside the wall of spray was a mass of white foam. As the disturbance moved away to port the spray attained a height of about 40 ft and a funnel descended from the base of the Cb cloud overhead. It maintained an up-and-down movement for a few minutes before retreating into the cloud, and did not become a fully developed waterspout. The wall of spray then gradually disappeared. Air temp. 78°F, wet bulb 77°, sea 78°. Wind s'ly, force 4–5.

Position of ship: 28° 00'N, 48° 00'W.

Note. This is an unusual account of what a waterspout is like at close quarters, even when not in a fully developed state.

Editorial

The Economist, in a Banking Survey in their issue of 15th June, has called this year 'The Year of the Mergers' and, though not usually given to anything but serious thought, publishes with the article a picture of William I over the caption "William the Conqueror, with whom it began (and with whom else?)".

Indeed, mergers seem to be very much a part of our everyday life and not in Big Business alone for even the M.C.C., which for almost 200 years has been, though never appointed as such, the recognized governing body of cricket, has been merged into a larger Sports Council, a body claiming Government aid, though it will still function as a separate club and still make the Laws of Cricket.

Large shipping combines have been a feature of the industry for many years and, though it is interesting to find in our registers that there are still a few shipping companies trading under the same name as they were in 1854 when we first went into business, the days of the old 'family' company have substantially gone whilst the naming of 'Captain and Company' as a vessel's owners in *Lloyd's Register* went out many years ago.

We, in the Marine Branch, take a certain pride in maintaining as far as possible a personal link with our voluntary marine observers. This we do by a letter after every meteorological logbook has been examined, by visits as often as possible to observing ships by our Port Meteorological Officers, by publication of *The Marine Observer*, by open invitation to any observing master, deck officer or radio officer to visit us when on leave and, not least, by the keeping of a personal record card for every observer. Provided that their names and initials were always correctly given on the inside back cover of the meteorological logbook, the last-named presented little difficulty as long as constituent companies, no matter how big the group to which they belong, preserved their identities, kept their own officers and continued in their own trades. Lately, however, there seems to have been a tendency for officers to be shifted from one company to another within their group and even for ships to be shifted to the trades of their sister companies, sometimes even being temporarily renamed for the purpose. All this makes the keeping of cards a difficult business for, whilst the chances of there being more than one Mr. Williams (quoting the most frequent name on our list) in a company owning four ships are reasonably small, the chances of the name occurring several times in a group comprising a dozen companies and 300 ships are alarmingly large. It was thus that we viewed with no little misgiving a recent front-page headline in the *Journal of Commerce* which reads "More shipping mergers likely say experts".

The only solution seems to be to appeal to all our observers to make quite sure that all the necessary information (names, initials, dates of joining and leaving, where appropriate, last observing ship and signature) is entered on the inside back cover before the meteorological logbook leaves the ship. Only thus can we be reasonably certain that we are giving credit where credit is due and avoid getting officers' records mixed.

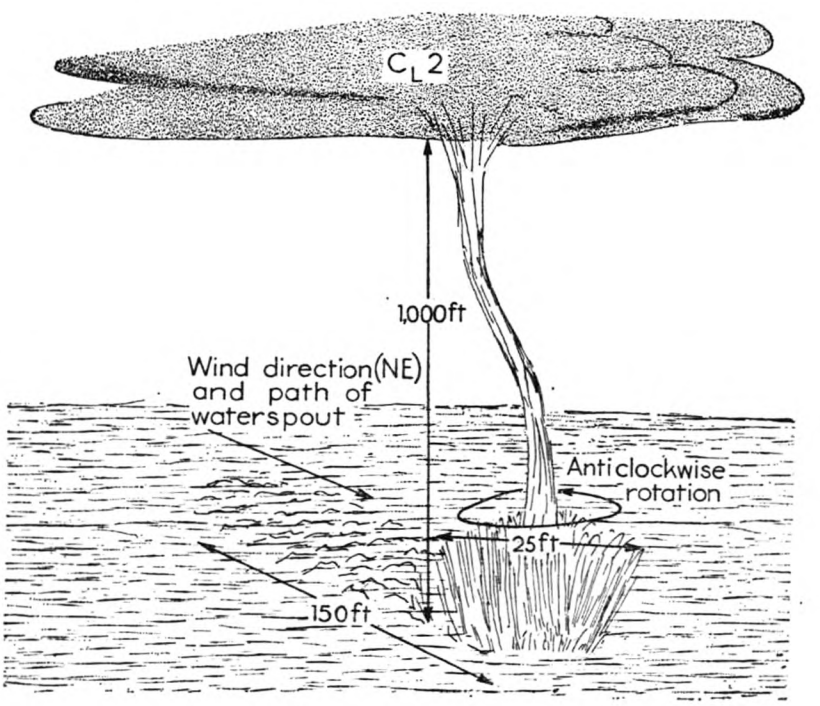
It may well be that weather observations made aboard ship benefit from shipping mergers; the officer who finds himself in strange waters is likely to have his weather sense sharpened by the change of circumstances and thus become a better observer. In recent months a ship, hitherto unknown except on the Far East run, has sent us a meteorological logbook compiled on the west coast of South America, Western Ocean ships have appeared in the Mediterranean and off West Africa, whilst a ship from the New Zealand run recently spent several weeks in the vicinity of Nantucket Shoals 'mothering' a fishing fleet. This sort of thing spells new observations made by fresh minds interested in fresh surroundings. Whereas an officer who spends all his sea life in going from A to B and back to A may become so familiar with his weather that at times it may seem hardly worth recording at all or, at best, a chore.

off Morocco

m.v. *Empire Star*. Captain G. T. King. Las Palmas to Lisbon.

3rd December 1967. At 1325 GMT a waterspout in the fully developed state was seen for 5 min. As it approached the ship it began to disperse, breaking up first halfway up the column. When we passed it about half a mile off, the disturbance of the sea at the base of the spout was still in evidence. The base was about 25 ft in diameter but the disturbed area was approximately 150 ft across. The foot of the column was revolving in an anticlockwise direction, the time taken for one revolution being about 4 or 5 sec. The funnel, estimated to be about 1,000 ft in height, was bent in such a way that the base preceded the upper part. It was moving from about NE, the same direction as the wind, which was blowing at force 3–4 generally. A noise of rushing wind was heard at the place of closest approach—half a mile from the ship. The wind strength near the spout was estimated to be about force 5. Air temp. 64·9°F, wet bulb 61·4°, sea 64·2°.

Position of ship: 33° 35′N, 12° 17′W.



Note. Although we have had many observations of waterspouts, there have been comparatively few which gave positive information about the speed of rotation. This report is particularly interesting for that reason.

HEAVY THUNDERSTORM

off Costa Rica

s.s. *Pacific Reliance*. Captain C. G. Killick. Oakland to Panama.

9th October 1967. At 0420 GMT the centre of a violent electrical storm passed over the ship. Lightning was observed to run down the ship's masts and along the aerials, thunder occurring simultaneously. The vessel and surrounds were almost continually illuminated during the height of the storm. There was very heavy rain accompanied by a NE′E wind of force 6. The storm area completely covered the radar screen on the 6 mile range; other traces were visible up to 20 miles, but they were less intense. Air temp. 72·0°F, wet bulb 72·0°, sea 80·9°.

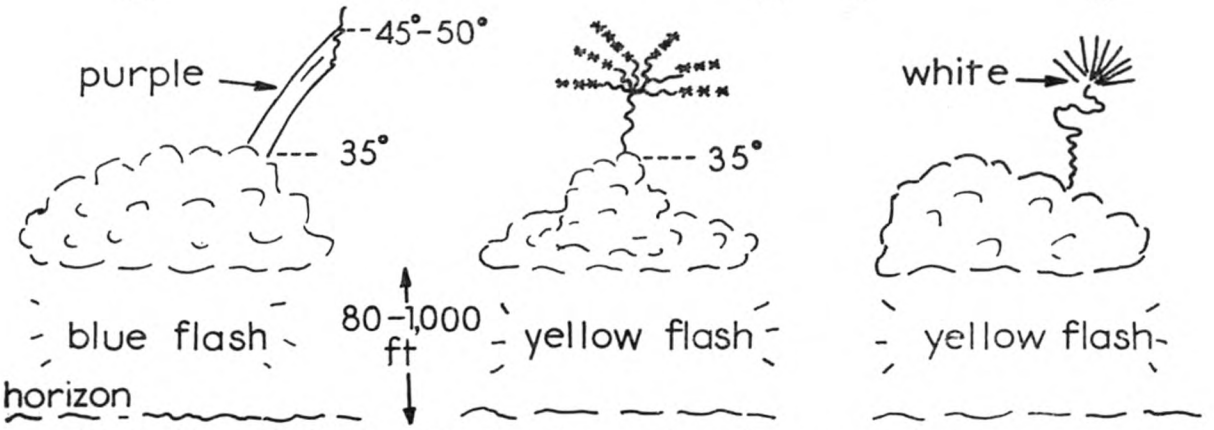
Position of ship: 9° 00′N, 85° 15′W.

LIGHTNING

North Atlantic Ocean

m.v. *Geesthaven.* Captain G. Powell. South Wales to West Indies. Observers, the Master, Mr. I. McLachlan, 3rd Officer and the Radio Officer.

13th October 1967. At 0215 GMT lightning of unusual character was seen in the south-east. Instead of travelling downwards towards the sea it began at an elevation of about 35° and travelled upwards to an altitude of 45° to 50°. In some respects it



resembled a firework display. No thunder was heard, nor was there any rain in the vicinity of the ship, but the radar indicated heavy rain clouds about 15 miles away and moving in a NW'ly direction. This unusual type of lightning was seen over a period of 3 hours. The general appearance is shown in the accompanying sketches. Air temp. 79°F, wet bulb 76·8°, sea 83·3°. Wind light and variable.

Position of ship: 19° 36'N, 55° 30'W.

EXCEPTIONAL VISIBILITY

South Arabian Coast

m.v. *Sir Galahad.* Captain J. Swan. Bahrein to Aden. Observer, Mr. P. G. Carr, 3rd Officer.

26th October 1967. On previous voyages along this coast Ras Fartak has shown up on the radar at 35 miles but, on passing 12 miles to the south of it, it has only been faintly visible. Today, however, it was clear enough for visual bearings to be taken of it at a distance of 44½ miles.

At noon the visibility was still so good that another landmark, the Asses Ears (Ras Shurwain), could be clearly seen at 49 miles. The sky was cloudless and the wind light and variable. Sea rippled. At 0530 GMT: Air temp. 82·0°F, wet bulb 78·2°, sea 82·0°.

Position of ship: 15° 42'N, 53° 02'E.

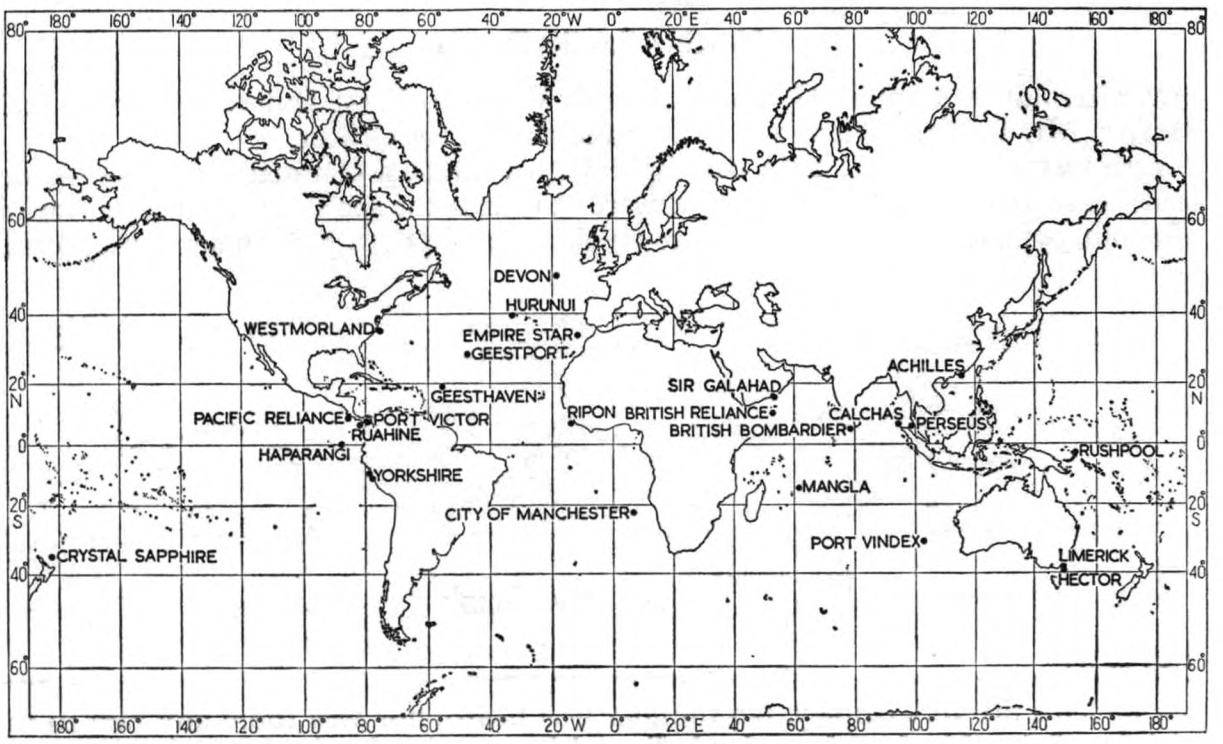
CURRENT RIPS

Gulf of Panama

m.v. *Ruahine.* Captain R. G. Hollingdale. Papeete to Balboa. Observer, Mr. J. Gibbard, 3rd Officer.

10th October 1967. At 1900 GMT the vessel entered an area of very confused sea caused by strong sets. The lines of demarcation between confused and calmer seas lay in an E–W direction. The wind was W'ly, force 2 although the sea gave an appearance of force 4 to 5 in places. At 2045 the confused water was still in evidence but not so marked as before. The vessel's course was 051° and speed 16½ kt. A current calculated between 1700 and 0001 gave a set of 228° and a drift of 7·4 miles over a distance through the water of 121 miles.

Position of ship: 6° 11'N, 81° 07'W.



Position of ships whose reports appear in "The Marine Observers' Log".

Note. The *Ruahine* was at the time in the area where normally the east-flowing Equatorial Counter-current is predominant but very close to where large-scale eddies form—in the Gulf of Panama—and the waters recurve into the South Equatorial Current flowing west. The Current Atlas shows that, although easterly drifts may usually be expected, those in south-westerly directions occur over 20% of the time.

vicinity of Galapagos Islands

m.v. *Haparangi.* Captain I. Y. Batley. Auckland to Balboa. Observers, Mr. R. A. Cook, 2nd Officer and Mr. P. G. Starkey, 3rd Officer.

10th November 1967, 1630 GMT. Steering a course of 048° towards Balboa, the vessel (mean draft 30 ft) encountered a series of strong current rips running in an E–W direction. These caused the vessel to swing 5–6° to port on leaving each area of disturbed water. The sea temp. was taken at frequent intervals both in and out of each rip but no difference greater than 0·2°F was found. The separation between the rips varied between 400 and 1,000 yd approximately. After 15 to 20 rips had been encountered they became more widely spaced and less intense. Although the wind was only SSE, force 2 there was a lot of broken water in each rip. Sea temp. 73·6°F.

Position of ship: 0°00′, 88°00′W.

Note. The *Haparangi* was in the area where the Peru Current flows into the South Equatorial Current and was thus subjected to the flow disturbances characteristic of this area.

LARGE RISE IN SEA TEMPERATURE

off Cape Hatteras

m.v. *Westmorland.* Captain D. E. Moran. Philadelphia to Savannah. Observers, Mr. R. Longworth, 2nd Officer and Mr. P. Rolfe, Cadet.

18th December 1967. Shortly before 0600 GMT the vessel was off Cape Hatteras steering due south. For the previous 3 hours the sea temp. had remained steady at

51°F. At 0600 the ship passed through a tide rip running 040° to 220°. The sea temp. immediately rose to 59° and continued to rise rapidly until by 0630 it had steadied at 78°. A rise in air temp. was also noted, being 52° at 0530 and 66° at 0800. It was assumed that the vessel had entered the Gulf Stream.

Position of ship: 35° 14′N, 75° 07′W.

Note. In this area there is normally a very rapid rise of sea temperature with increasing distance southwards. The change reported by m.v. *Westmorland*, although very large, is by no means abnormal.

DISTURBED WATER

vicinity of Rondo Island, N.W. Sumatra

m.v. *Calchas*. Captain H. K. Timbrell. Belawan to Colombo. Observer, Mr. P. J. Wood, 3rd Officer.

21st October 1967, 0045–0135 GMT. Having rounded Rondo Island from the south, a large area of broken water was seen ahead. As the vessel approached, six distinct lines of broken water were visible on the radar; they were estimated to be 1 mile apart and at least 5 miles long. The waves forming these lines were 4–6 ft in height. Having cleared these rips at 0116, the vessel entered a large circle of broken water inside which there was an area of calm, mirror-like sea about 2 miles in diameter. The waves enclosing this area were about 3 ft high and were all breaking towards the centre of the circle. The sea temp. before the broken water was 82·0°F, in the broken water it was 83·8° and in the calm patch it was 81·8°. Soon after, having cleared the area, the sea temp. rose slightly to 82·1°.

Position of ship at 0001: 6° 00′N, 95° 36′E.

Note. Dr. L. H. N. Cooper of the Marine Biological Association of the United Kingdom comments:

"There are interesting features about this report. The six lines of broken water 1 mile apart were due to internal waves breaking the surface of the sea as explained by Dr. LaFond in the January 1967 issue of *The Marine Observer*.

"On Admiralty Chart No. 2760 rips are shown about 11 miles north of Pt. Rondo and over about 900 fm of water. Evidently the phenomenon is often reported thereabouts. The mountain range of N.W. Sumatra would seem to continue under the sea where the soundings are very irregular. Seven miles west of the charted rip, at 6° 15′N, 95° 00′E, there is an isolated sounding of 33 fm with nearby soundings of 842 and 1,420 fm.

"Speculatively one may suggest that the 33 fm sounding represents the flattish top, about 2 miles in diameter, of a steep-sided submerged islet rising from a depth of 1,000 fm. Large internal waves were stopped at the islet slope so that the 2-mile-diameter circle of mirror-like water resulted. A semicircle of breaking internal waves could result from refraction of a unidirectional internal wave train over the shoaling slope of the islet but, to produce a complete circle of breakers, at least two wave trains would have been needed—quite possible. This explanation requires that the circle precisely overlays a flat-topped bank at a depth of about 33 fm. It would be strengthened by evidence based on soundings, or that the mirror-like circle was centred, within a mile or so, on 6° 15′N, 95° 00′–95° 01′E.

"There may be a 'chicken and egg' problem here. Which came first, the bank or the rips? The bank may be a submarine rock mountain top or it may be coral. Coral flourishes in breaker zones. If, therefore, the bank is coral, it may have developed where it is because rough water was first present.

"Whatever the bank is made of, it would seem to have been planed off during an ice-age low sea-level. But, if so, why has not a coral atoll developed on it during the period of rising sea-level? For research workers, therefore, the observations of the *Calchas* open up some fascinating topics for study but it may be some time before a research ship is around to follow up. Since the position is on the shipping lane from the Malacca Strait to all points west, voluntary observers could build up information of much value since, on at least some passages, the rip phenomenon would be seen and available for observation. A desirable procedure would be:

1. Set course through the point 6° 15′N, 95° 00′E or within a mile or so.

2. Start the echo-sounder crossing the meridian 95° 18′E and run it to 94° 45′E or vice versa and submit the record with the meteorological logbook. Any phase changes must be clearly annotated. It is very easy for echo-sounding records to be ambiguous.

3. Take every opportunity for an accurate fix, as on Rondo, and state course explicitly as magnetic or true.

4. Keep an accurate record of events in terms of time.

5. Note, with relation to the bottom-sounding, the inner edges of the circle of breaking waves.

6. Note whether the circle is complete or only part-formed.

7. Note any change in the direction of the 'wave-front' at the surface as the internal wave train runs over shallowing depths and approaches the breaking circle. It seems likely that the wave-front may wheel round much as does a heavy sea from any direction when it approaches a shore.

8. Any information about the weather, state of sea, etc. which may possibly be relevant.

9. A brief narrative from any ship passing the area and observing nothing unusual would be appreciated for the record, although it might not appear in *The Marine Observer*. Negative observations play a most important part in scientific research."

LINE OF DEMARCATION

off Hong Kong

m.v. *Achilles*. Captain R. C. Riseley. Pusan to Hong Kong. Observers, the Master, Mr. J. D. Read, 2nd Officer and Mr. D. C. S. Thompson, 3rd Officer.

29th October 1967. At 0400 GMT the vessel crossed over a well-defined line separating an area of light-green water from blue water. The green water extended to the north and west to the China coast, thence southwards down the coast. On the green side the sea temp. was 72·8°F, while on the blue side it was 75·6°.

Position of ship: 22° 24′N, 115° 36′E.

UNDER-SEA VIBRATION

vicinity of New Ireland, Western Pacific Ocean

m.v. *Rushpool*. Captain T. W. Cameron. Nagoya to Sydney.

25th December 1967. Very heavy vibration was experienced for about 60 sec at 0110 GMT. No soundings were recorded during this time and no bottom recorded on 550 fm after the vibration ceased. The vibration was heavy enough to switch off the radar which was in use at the time.

Position of ship: 4° 00′S, 153° 20′E.

Note. Mr. J. Piegza of Kew Observatory comments:

"The difficulty about this report is that I cannot quite explain it unless the time, as reported, is wrong. The facts are as follows: on 25th December 1967 at 01 h 23 m 33·6 s GMT a very large earthquake (magnitude of about 7½) occurred in the position 05° 18′S, 153° 42′E. The distance of the *Rushpool* from the epicentre was at the time slightly over 1°. The vibrations caused by the compressional waves from this powerful shock should reach the ship in about 30 sec and should last for about 1 min as, in fact, is reported. There is, however, the discrepancy of 13 min between the actual occurrence and the report. This difference could be explained by the existence of an earlier large foreshock. However, no such shock was reported by the U.S. Coast and Geodetic Survey. The Central Observatory at Rabaul (about the same distance from the epicentre) and its satellite stations, all equipped with high-magnification modern seismographs, also did not record such a foreshock."

BAT

off Liberia

m.v. *Ripon*. Captain J. J. Grugan. Tyne to Monrovia.

21st December 1967. At 0800 GMT a large bat-like creature was sighted. The

length of the body was about 16 inches and the wing span approx. 24 inches. It was yellowish-brown in colour.

Position of ship: 6° 46′N, 12° 00′W.

Note. Mr. John Edwards Hill of the Department of Zoology, Natural History Museum comments:

"The animal sighted from m.v. *Ripon* seems likely to have been an example of the Straw-coloured Fruit Bat, *Eidolon helvum*. This species is very common and widespread in West Africa and has been taken as far at sea as 150 miles from land. Its length of head and body is rather less than the approximation given by the observer, but in other respects the species agrees with the observation."

BIRDS

off Cape Everard

m.v. *Limerick*. Captain P. D. Guerrier. Melbourne to New Caledonia.

20th October 1967. At 0035 GMT, with Cape Everard bearing 040° at 28 miles, the vessel passed numerous large flocks of sea birds, black in colour. At 0050 we approached an area of sea that was so heavily covered with birds that it appeared black. The area covered was estimated to have been approximately 10 to 15 acres. As the vessel approached there was a noise like millions of drums being beaten as the birds in our path endeavoured to take to the air. Thousands gave up the attempt and sat on the surface right in the path of the ship. For a minute or so we appeared to be sailing on a black carpet as we ran over thousands of them. The birds, which must have been bloated on fish, seemed none the worse for being run over, for they popped up alongside, not even bothering to keep out of the ship's wake. A fishing boat was seen about 7 miles away, so apparently we must have crossed an area abounding in fish. Several seals were seen sunning themselves on the surface and later a number of whales were sighted.

Position of ship: 38° 12′S, 148° 42′E.

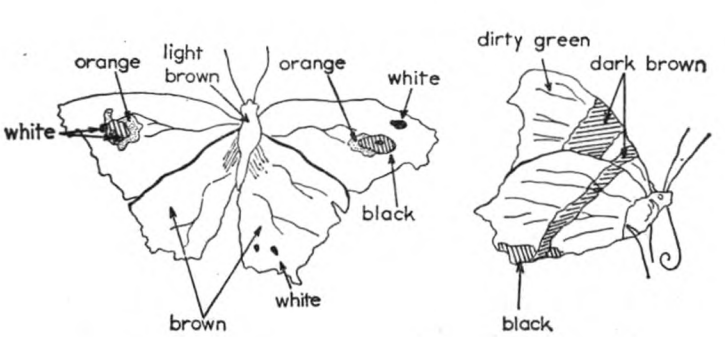
BUTTERFLY

Indian Ocean

s.s. *British Bombardier*. Captain J. R. Scott. Kharg Island to Port Phillip. Observer, Mr. A. N. Warren, 2nd Officer.

21st November 1967. A butterfly came into the wheel-house at 0800 GMT and after flying around a couple of times it alighted on the deck. On inspection it was found to be dead. At the time the vessel was about 90 miles away from the coast of Ceylon. A sketch is enclosed [reduced to half life-size]. At 0600: wind NE, force 5.

Position of ship: 5° 40′N, 78° 40′E.



Note. Mr. R. I. Vane-Wright of the Department of Entomology, Natural History Museum comments:

"There is no doubt from the drawing that the insect is *Melanitis Leda* (L.), a common Satyrid butterfly of the old-world tropics. I know of one other record of several specimens,

possibly of this species, being noted over 100 miles off the coast of Sierra Leone. It is just possible, however, that this specimen travelled out on the ship.

"The sub-species of *leda* found in Ceylon is *ismene* (Cramer) but one cannot tell from the drawing whether or not it belongs to the Ceylon sub-species.

"I might add that the 'black' zone added at the bottom of the underside view is probably merely grease or oil, or damage to the body of the specimen itself.

"As I propose to revise the genus *Melanitis* I am very grateful for this record."

SEA SNAKES

Gulf of Panama

m.v. *Port Victor*. Captain R. A. Wight. Lyttelton to Panama. Observer, Mr. D. N. Ford, 3rd Officer.

12th November 1967, 1930–2030 GMT. When the vessel was approximately half-way across the Gulf of Panama, several sea snakes were seen amongst a small amount of debris of leaves and twigs. They were about 12 inches long and pencil thin, with a heart-shaped head roughly the size of a small sewing thimble and a short, tapered tail. The body was brown/yellow with black bands. Sea temp. 82·5°F.

Position of ship at 1800: 7° 42′N, 79° 54′W.

Note. Mr. E. N. Arnold of the Department of Zoology, Natural History Museum, comments:

"There is a slight possibility (suggested by the presence of leaves and twigs) that the snakes were of a non-marine species which had been carried out to sea with floating vegetation. However, I think it more likely that they were young representatives of the widely distributed sea-snake *Pelamis platurus*. This form occurs over a huge area from the coast of Southern Siberia to Tasmania and from Madagascar in the west to the Bay of Panama in the east. It is very common in this last locality. The outline of the head may be compared to that of an elongate heart. The tail is comparatively short and flattened from side to side. The colouring is typically black-brown above and yellow beneath with dark bands on the tail. Others have a more complex pattern, in which the dark colouration above is broken into blotches.

"Like all sea snakes, this one is venomous though probably unaggressive."

SWIMMING CRABS

Indian Ocean

m.v. *British Reliance*. Captain G. S. Willis. Las Palmas to Mina al Ahmadi. Observer, Mr. R. I. Barnes.

10th–11th October 1967. From 2200 GMT on the 10th to 0100 on the 11th, when the vessel was stopped, the Aldis lamp was periodically shone on the sea close to the ship, and on each occasion small crabs were seen passing down the ship's side and out beyond the range of the light. Their eyes reflected a brilliant orange sparkle, thus enabling those beyond the light to be detected.

Generally the crabs were about 2 inches in diameter and orange to red-brown in colour. The surface of the sea had a dusty appearance, presumably due to some form of plankton as the crabs seemed to be feeding on it. The direction of movement was towards the SW. A number of sharks were also seen and it was thought they were feeding on the crabs.

Position of ship: 7° 04′N, 53° 26′E.

Since the observation of 10th–11th October, we have received *The Marine Observer* for October 1967 and note on p. 170 that similar crabs were seen in the same area in October 1966. The thought of obtaining a sample did not occur to us until the report was read, but the lesson has been noted for future occasions.

Note 1. Previous observations of swimming crabs in the same general area and about the same time of year were received from m.v. *Shropshire* on 26th December 1960 in 17° 33′N, 55° 10′E, from m.v. *Herefordshire* 21st October 1963 in 10° 43′N, 59° 26′E and from s.s. *City of New York* on 22nd October 1966 in 3° 26′N, 48° 17′E. All three observations were forwarded to

Dr. A. L. Rice at the Department of Zoology, Natural History Museum and the last-named was published with his comment in the October 1967 number of *The Marine Observer*.

Concerning the above observation from the *British Reliance*, Dr. Rice comments:

"Needless to say, we are very pleased to have these further records of the phenomenon. In general this report agrees very well with all previous reports. This whole business of the swimming crabs is very interesting and the reports we have had from you, although not substantiated by specimens, furnish a significant proportion of what is known of the phenomenon.

"To reassure you that the reports do not simply accumulate in a dark corner of the Museum I can tell you that the *Herefordshire*'s observations were referred to in the report of the International Indian Ocean Expedition to which I, in turn, referred in my note published in the October 1967 *Marine Observer*. The observations from the *Shropshire* and *City of New York* are included in a paper produced by G. F. Losse, formerly of the East African Marine Fisheries Research Organization at Zanzibar and now with the Food and Agriculture Organization, Rome.

"Finally I am delighted to see from the report of the *British Reliance* that my note in *The Marine Observer* may encourage the collection of specimens by your observers."

Note 2. An article by Dr. Rice on the swarming of swimming crabs will be published in the January 1969 number of *The Marine Observer*.

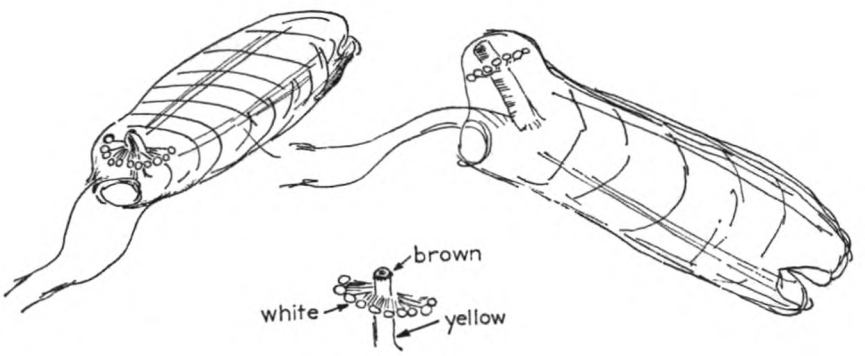
MARINE LIFE

S.E. Atlantic Ocean

s.s. *City of Manchester*. Captain G. R. Jackson. Cape Town to St. Vincent (Cape Verde Islands). Observers, Mr. T. D. Parkhouse, 2nd Officer and Mr. T. F. Weale, Extra 2nd Officer.

11th November 1967, 0730 GMT. Streaks of brown 'scum' were seen on the sea surface and a sample taken in the sea-temperature bucket was poured into a tumbler for examination. There was a very high concentration of the objects shown in the accompanying sketches, between 150 and 250 being seen in the glass. They were extremely active and constantly on the move. The body was about 7/10 inch long and the 'antennae' added a further 4/10 inch to the length. It had a transparent look and the 'framework' of the body consisted of faint feathery lines resembling scratches on a glass surface. Movement was carried out by contracting and expanding the body, at each end of which there was an orifice. One of these resembled a mouth with heavy lips. Sea temp. 65·5°F.

Position of ship: 23° 03′S, 7° 57′E.



Note. Dr. J. David George of the Department of Zoology, Natural History Museum, comments:

"The organisms noted by the observer are members of a group of animals known as the tunicates (*Phylum-Chordata, Sub-phylum-Urochordata*). The majority of species in the urochordates are 'sea squirts' which are found attached to rocks, pilings and ships' bottoms

throughout the world. However, some species of urochordates are specialized for a planktonic existence, the specimens described belonging to the planktonic group Thaliacea. Members of the Thaliacea are distinguished from related groups by having buccal and atrial siphons at opposite ends of the body (see observer's description). Most Thaliaceans live in tropical and semi-tropical waters and are often found in very great numbers.

"Although it cannot be stated categorically from the description given it seems likely that the specimens encountered belong to either the genus *Doliolum* or *Salpa*.

"The rhythmic contractions of the circular muscle bands in these animals cause the body to pulsate, water being drawn in at one end and expelled at the other. As the sea-water passes through the body oxygen is extracted and small planktonic organisms are filtered off.

"The peculiar structure situated at the dorsal hind end of the body is known as the cadophore and is associated with the complex method of reproduction in these animals."

LUMINESCENCE

New Zealand waters

m.v. *Crystal Sapphire*. Captain J. E. Leaver. Napier to the Fiji Islands. Observers, the Master, Mr. P. G. S. Dove, 2nd Officer and Mr. Pearce, Lookout.

5th October 1967. At about 1500 GMT a small bright object was passed about 30 yd from the ship. It was thought at first that this was an electric light of the type carried on a floating lifebuoy, and the vessel was turned about to investigate. About a dozen other similar lights were observed and when the Aldis lamp was directed on to them they were seen to be white objects about 1 ft in length floating on the surface and resembling dead fish. Presumably intense luminescence was the reason for the bright lights seen. The night was extremely dark and the luminescence was visible at a distance of about 100 yd.

Position of ship: 36° 41′S, 178° 40′E.

entrance to Strait of Malacca

s.s. *Perseus*. Captain D. D. McIntosh. Cape Town to Singapore. Observers, Mr. B. G. Ball, 2nd Officer and Mr. G. A. Neale, Officer Cadet.

22nd November 1967. Between 1815 and 1830 GMT a display of luminescence was observed in the form of bands of light which swept rapidly past producing a 'cart-wheel' effect. The frequency of these bands was about two per sec. They approached from off the port bow and receded off the starboard bow. Air temp. 81·2°F, sea 82·5. Ship's course 127°, speed 18 kt.

Position of ship: 5° 30′N, 97° 30′E.

ABNORMAL REFRACTION

vicinity of the Azores

m.v. *Hurunui*. Captain S. G. Robinson, M.B.E. Curaçao to Dunkirk. Observer, Mr. A. Mackinnon, 2nd Officer.

9th November 1967. At 0400 GMT, Point Albarnaz Light on the Island of Flores was sighted bearing 287° at a distance of about 60 miles. Air temp. 64°F, dew-point 57°, sea 68·5°.

Position of ship: 39° 47′N, 32° 29′W.

Note. The synoptic weather chart for 0600 GMT on the 9th November 1967 shows that the Azores area was under the influence of a well-developed anticyclone. In such a pressure system an inversion of temperature occurs, i.e. the temperature of the air increases with height in the lower layers of the atmosphere. As a result rays of light from an object below the observer's horizon follow a path corresponding with the curvature of the earth and thus render the distant object visible.

The Admiralty *List of Lights* gives the geographical range of this light as 23 miles.

off Cape Everard

s.s. *Hector*. Captain J. Petticrew. Melbourne to Sydney. Observers, the Master, Mr. J. E. Tumilty, 3rd Officer and Cadet F. D. Duffin.

29th November 1967. The loom of Cape Everard Light was seen distinctly at 1020 GMT (2020 SMT) at a distance of 65 miles, the normal range of the light being 20 miles. The actual light was observed 40 min later at 52 miles' distance. Ships' lights were plainly seen at 17–18 miles and at this range were drawn out vertically; on closer approach they assumed their normal appearance. Radar echoes of the coastline were picked up very clearly by the Kelvin Hughes Type 2C set at 48 miles. These conditions persisted for the next 2 hours when the wind veered from NE, force 2–3, to E'N and freshened to force 4. No significant change of relative humidity or of sea temp. was observed. Air temp. 66°F, wet bulb 60·7°, sea 60°. 6/8 cloud cover.

Position of ship at 1200: 38° 18'S, 148° 42'E.

Note. When the temperature of the sea surface is less than that of the air in the lower layers of the atmosphere, conditions are such that the light from a distant object beyond the observer's horizon tends to follow the curvature of the earth. An object, which would not normally be visible, is seen by the observer. When the sea is warmer than the overlying air, the rays of light follow a path away from the surface, and distant objects which would normally be visible are not seen.

SUN PILLAR

South Indian Ocean

s.s. *Mangla*. Captain G. B. Thomas. Gan to Durban. Observer, Mr. T. W. Dudman, 4th Officer.

12th November 1967. A partial 22° solar halo was seen at 1300 GMT for a total of 3 min. Also seen when the halo was at its brightest, was a vertical pillar extending upwards from the sun towards the arc. The pillar was white and colourless and considerably brighter than the halo. At the time of observation the sun's altitude was 13° 12'. Ci and Cs cloud were present.

Position of ship: 15° 35'S, 61° 21'E.

Note. There are differences of opinion as to the precise conditions which exist when a sun pillar is observed. As with halo phenomena, it occurs when ice crystals of the correct shape are present and their axis orientation at the necessary critical angle. It has been suggested that the phenomenon may occur when flat ice crystals are rotating rapidly about a horizontal axis and thereby assuming every possible orientation.

LUNAR HALO

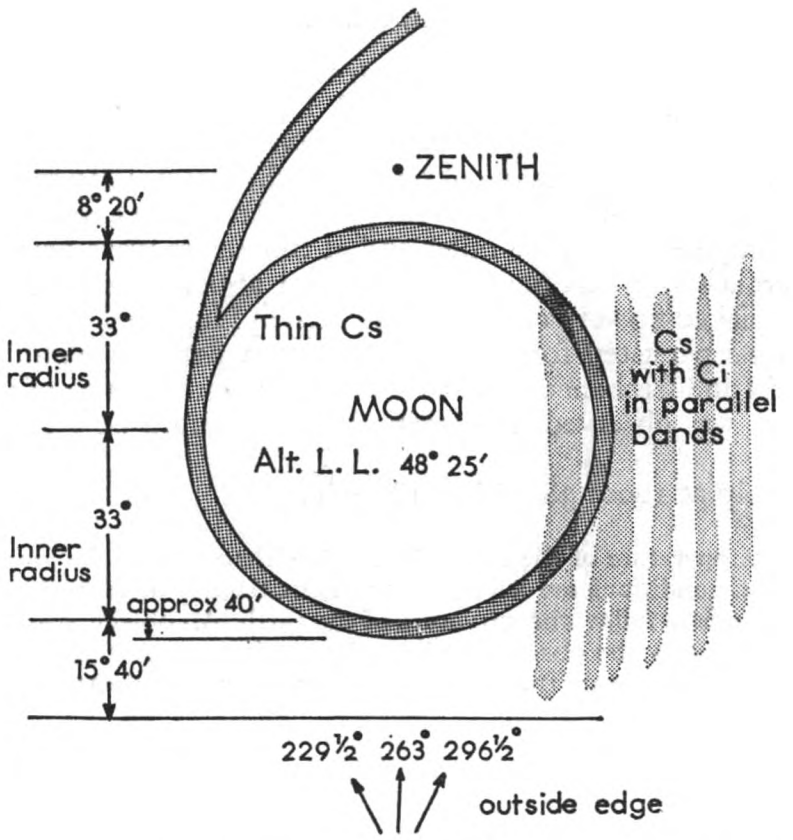
South Indian Ocean

m.v. *Port Vindex*. Captain A. J. Hawkins. Fremantle to Durban. Observers, Mr. C. G. W. Hunter, 3rd Officer and Mr. R. A. Cunningham, 4th Officer.

11th October 1967. The lunar halo shown in the accompanying sketch was observed during the evening. It was first seen at 1515 GMT and remained visible until about 1540 when it gradually faded away. The arc was visible for the same length of time and was as bright and well defined as the halo.

There was complete coverage of Cs which was thin enough in places for the brighter stars to be faintly seen.

The bearings and dimensions shown in the diagram were carefully checked, in particular the radius of the main halo which remained a constant 33° throughout



the period. At the time of observation the moon's age was approximately 7 days before full moon. Air temp. 64°F, dew-point 58°.

Position of ship: 30° 19′S, 101° 42′E.

LUNAR FOG BOW

North Atlantic Ocean

s.s. *Devon.* Captain J. D. Hellings. San Juan to Falmouth. Observer, Mr. C. Greenwood, 2nd Officer.

12th November 1967. When the vessel was passing through patches of fog at 0233 GMT, a well defined semicircular lunar fog bow was seen ahead. Measurements by the sextant showed that the bow had an elevation of about 40° and a diameter of about 80°. Measurement of the elevation is only approximate as there was no horizon. The bow was about 5° in width. It was visible for 2 or 3 min, but another bow was seen from 0245–0250. Air temp. 55·7°F, wet bulb 55·7°, sea 56·6°. Wind SW, force 2. Cloud 4/8 St.

Position of ship: 47° 29′N, 19° 09′W.

Note. A fog bow is a white rainbow of about 40° radius seen opposite the sun, or moon, in fog. Its outer margin has a reddish tinge and its inner a bluish tinge, but the middle of the band is quite white. A supernumerary bow is sometimes seen inside the first, the colours being reversed. The bows are produced in the same way as the ordinary rainbow, but owing to the smallness of the water drops, the diameter of which is about 0·05 mm, the colours overlap and the bow appears white.

METAL DISCOLORATION

Peruvian waters

m.v. *Yorkshire.* Captain P. Saunders. Supe and Chimbote. Observer, Mr. M. Kingsmill, 2nd Officer.

20th–23rd December 1967. When the vessel was at those two ports, the ship's brass fittings and silver-plated tableware became severely discoloured. The brass

turned black, blue and silver, while the tableware became tinted with red, green, black and gold colouring. This may have been caused by chemicals from the fishmeal processing factories and the fishmeal that was loaded, but it is also possible that hydrogen sulphide, mentioned in the *Sailing Directions* as the 'Callao Painter', was the cause of the trouble. In Chimbote, where the vessel was anchored well away from the factories, the effects were most noticeable. Some dead fish were seen on the surface of the water but they may have been discarded by the fishermen. Fresh white paint was not discoloured, but it may perhaps be no longer lead-based. Another rather remarkable incident was the change in colour of the little silver balls used to decorate the Christmas cake. These turned black and gave rise to somewhat colourful language! The air temp. during the period varied between 71–73°F at noon (1700 GMT) and 63–64° at midnight, while the sea temp. ranged from 57–59° at noon to 62–65° at midnight. Winds SW'S–SSE, force 2–3. When at anchor in Chimbote Bay the air on the night of the 22nd/23rd felt very oppressive. The water at Supe and Chimbote was yellowish or khaki-coloured and, on departure from Chimbote, this was seen to extend seawards for about 5 miles.

Position of ship on 20th at Supe: 10° 48'S, 77° 48'W.

Position of ship on 22nd at Chimbote: 09° 05'S, 78° 35'W.

Note. This phenomenon of the Callao Painter is well known on the Peruvian coast and is referred to on pages 29, 30 and 414 of the *South American Pilot*, Vol. III.

AURORA

The following notes have been received from Mrs. Mary Hallissey of the Aurora Survey:

"Listed below are the names of ships from which reports have been received at the Balfour Stewart Auroral Laboratory of the University of Edinburgh of aurora sightings during the period October–December 1967, the ships' positions and a brief summary of the auroral forms visible.

"Expectations of increased auroral activity with the approach of another sunspot maximum are still not being fulfilled—indeed we feel a little diffident about mentioning it again—and it is obvious from the list that spectacular aurora is still very much limited to higher latitudes, with most infrequent southward-spreading displays. Geomagnetic activity during these three months was never more than moderately high and we are fortunate that so many ships were positioned far enough north to record the progress of the displays in the auroral zone. The Weather Ships at 'Alpha' and 'Juliet' during November were kept very busy, and must on occasions have welcomed cloudy conditions. Grateful acknowledgment is made of amazingly detailed reports and sketches and we thank all involved in providing us with these data."

Date (1967)	Ship	Geographic Position	Λ	Φ	I	Time (GMT)	Forms
12th Aug.	*Warkworth*	61°42′N 68°10′W	360	73	+81	0445–0520	HB, RB, RR, N
26th	*Manchester Merchant*	50°00′N 61°00′W	010	62	+75	0250–0338	N
6th Oct.	*Aldersgate*	53°10′N 47°20′W	030	64	+73	2300–0140	HB, R, N
12th	*Weather Monitor*	52°25′N 20°00′W	060	59	+69	0001	N
	Aldersgate	52°35′N 52°15′W	020	63	+74	2330–0100	HA, HB, RB, RR, P, N
23rd	*Ross Leonis*	71°45′N 14°56′E	120	70	+77	1745–1820	HA, HB, RB, P
	St. Giles	69°50′N 34°07′E	130	65	+78	1755–1822	HA, HB, RB
25th	*Weather Adviser*	61°49′N 33°03′W	060	70	+76	2250	N
27th	*Redcar*	51°48′N 55°00′W	020	63	+75	0015–0040	HA, RA
	Weather Adviser	61°50′N 33°08′W	060	70	+76	2345	RR
28th	*Weather Adviser*	62°04′N 33°03′W	060	70	+76	0650	RR
	Weather Adviser	61°54′N 33°20′W	060	70	+76	2030–0300	All forms
30th	*Weather Reporter*	59°05′N 19°06′W	070	65	+72	0300	N
	Weather Adviser	62°12′N 33°10′W	060	70	+76	0355	HA
1st Nov.	*Weather Adviser*	62°03′N 33°02′W	060	70	+76	0555	N
	Weather Reporter	59°02′N 19°15′W	070	65	+72	1945	N
	Weather Adviser	61°54′N 32°52′W	060	70	+76	2100, 2200	N
2nd	*Weather Adviser*	61°57′N 32°56′W	060	70	+76	1910–0500	All forms
	Weather Reporter	58°50′N 19°32′W	070	65	+72	2005–2030	RR
3rd	*St. Giles*	64°50′N 07°36′E	100	65	+75	1705–1725	HA, RA, RB, N
	Weather Adviser	61°56′N 33°00′W	060	70	+76	1945–0800	All forms
	Redcar	57°24′N 27°15′W	060	64	+73	2200	R, N
4th	*Weather Adviser*	62°02′N 33°06′W	060	70	+76	2215–0200	HA, HB, RR
	Weather Reporter	59°13′N 19°04′W	070	65	+72	2245–2359	HA, P
5th	*Weather Reporter*	59°17′N 19°08′W	070	65	+72	0145–0157	N
	Weather Adviser	62°03′N 33°22′W	060	70	+76	2200	N
7th	*Weather Reporter*	58°55′N 19°15′W	070	65	+72	0148–0156	N
8th	*Weather Adviser*	62°04′N 33°12′W	060	70	+76	0550–0750	P, N
	Weather Reporter	59°13′N 18°57′W	070	65	+72	1949–2200	RA, RR
	Weather Adviser	62°10′N 33°04′W	060	70	+76	2040–2300	HA, RB, RR
9th	*Weather Adviser*	62°04′N 33°04′W	060	70	+76	0545–0600	HA, RR, N
10th	*Weather Adviser*	62°00′N 32°52′W	060	70	+76	0455	N
	Weather Adviser	61°51′N 32°34′W	060	70	+76	2250–2300	N
11th	*Weather Adviser*	61°52′N 32°37′W	060	70	+76	0200, 0350	RB, N
	Weather Adviser	62°10′N 33°02′W	060	70	+76	2055, 2105	HB, RR
12th	*Weather Adviser*	62°08′N 33°04′W	060	70	+76	0145–0200	HB, RB
						0610–0800	RR, P, N
	Weather Reporter	59°08′N 19°00′W	070	65	+72	0510–0625	HA, N
13th	*Weather Adviser*	62°01′N 33°12′W	060	70	+76	0550–0800	HA, RR
	Weather Adviser	61°53′N 33°04′W	060	70	+76	2210	RR
14th	*Ross Leonis*	71°00′N 31°00′E	130	66	+78	1735–1755	RB, P
	St. Giles	71°50′N 33°55′W	130	66	+78	2010–2032	HA, RA, RR, P
23rd	*Weather Monitor*	61°55′N 33°20′W	060	70	+76	0100–0130	RR
	Weather Monitor	61°55′N 33°12′W	060	70	+76	2245	RB
24th	*Weather Monitor*	61°55′N 33°05′W	060	70	+76	0100	N
	Weather Monitor	62°05′N 33°55′W	060	70	+76	1840–2130	HB, V
	Weather Surveyor	58°58′N 18°53′W	070	65	+72	2308–0013	N
27th	*Weather Surveyor*	59°07′N 19°16′W	070	65	+72	2318–0730	HB, V
28th	*Weather Monitor*	61°42′N 33°25′W	060	70	+76	0225–0530	HB, RB, RR, N
	Weather Surveyor	59°06′N 18°32′W	070	65	+72	1930–0100	HA, HB, P
30th	*Weather Surveyor*	59°12′N 18°34′W	070	65	+72	0240–0345	HB
	Weather Monitor	61°55′N 32°05′W	060	70	+76	2200–0500	N
	Weather Surveyor	59°06′N 19°08′W	070	65	+72	2240–0210	RA, P
2nd Dec.	*Weather Monitor*	61°40′N 32°10′W	060	70	+76	2100–2400	HB, N
5th	*Weather Monitor*	61°55′N 31°35′W	060	70	+76	2000–2400	HB, P, N
	Weather Surveyor	54°48′N 18°30′W	070	65	+72	2240–2305	P
6th	*Weather Monitor*	61°50′N 31°35′W	060	70	+76	0400	R
	Weather Monitor	61°50′N 31°25′W	060	70	+76	2200–2400	HB, RR
7th	*Weather Monitor*	61°50′N 31°15′W	060	70	+76	0200, 0340	HB, RA
8th	*Weather Monitor*	61°40′N 31°00′W	060	70	+76	2400, 0100	HB
31st	*Weather Adviser*	59°09′N 18°48′W	070	65	+72	1900–2300	HA, RB, N

Key: Λ = geomagnetic longitude; Φ = geomagnetic latitude; I = inclination; HA = homogeneous arc; HB = homogeneous band; RA = rayed arc; RB = rayed band; R(R) = ray(s); P = patch; V = veil; N = unidentified auroral form.

(*Opposite page* 184)

The presentation of barographs at Bracknell on 4th January 1968; left to right: Captain C. P. Robinson, Captain K. Barnett, R.D., Dr. B. J. Mason, Captain J. Davies (deputizing for Captain W. F. T. Dan) (*see* page 195).

Captain N. F. Fitch, M.B.E. receiving his barograph from Dr. B. J. Mason at Bracknell on 18th April 1968 (*see* page 195).

(*Opposite page* 185)

Photo by courtesy of The Daily Telegraph

The yacht *Sir Thomas Lipton.*

551.509.5:629.12:681.3:797.14

Forecasting for "The Observer" Single-handed Trans-Atlantic Yacht Race

By R. F. Zobel, O.B.E., B.Sc.
(Assistant Director (Central Forecasting), Meteorological Office)

The third race of this series started from Plymouth on 1st June 1968 with over 40 entries from 10 countries. They were sailing conventional yachts, catamarans and huge trimarans, the largest over 60 feet long. But whatever the country, the hull or the rig, they all had one thing in common—a trial of strength and wits with the North Atlantic Ocean which, even in summer-time, can give a rough passage to the largest liners, let alone frail yachts.

In order to assist the competitors to surmount the difficulties in their path to Rhode Island the Meteorological Office was asked by *The Observer*, the organizers of the race, to provide a comprehensive radio-telephone forecast service, in consultation with the GPO, for the benefit of the competitors until all or most of them had reached at least 40°W. Forecasts from North America are available on a routine basis for the more westerly longitudes.

There are of course an infinite number of routes between Plymouth and Rhode Island, but they boil down roughly to five different possible types (*see* Fig. 1):

(*a*) Northern Route (3,100 miles)—this route takes advantage of the favourable Labrador current, but means that icebergs are a hazard.
(*b*) Great Circle Route (2,810 miles)—the shortest distance, but liable to head winds.
(*c*) Rhumb-line Route (2,920 miles)—heading constant all the way.
(*d*) Azores Route (3,500 miles)—usually the best of the weather and a good chance of a reasonable amount of following winds, particularly attractive to multi-hulled boats.
(*e*) Trade Wind Route (4,200 miles)—long, very southerly route, but good chance of following winds for much of the journey.

Since each of these routes was favoured by one or more competitors for various reasons, it is clear that the forecasts had to cover a wide area of the Atlantic Ocean. It was therefore decided that the forecasts should be similar to those which are regularly issued by the Meteorological Office in the Atlantic Weather Bulletin and broadcast by wireless-telegraphy for the benefit of shipping. Many readers will be familiar with these forecasts but, for the benefit of others, the areas covered are the coastal sea areas Biscay and Finisterre and the area bounded by the 35th and 65th parallels and by 15°W and 40°W longitudes. Normally, forecasts are also included for sea areas Denmark Strait and North Iceland, but these were omitted in the race forecasts. Forecasts were for 24 hours from time of issue, which was once a day at 1940 GMT, and they were broadcast initially by radio-telephone from Land's End Radio and later from North Foreland Radio by the GPO at 2015 GMT. The first forecast was issued on 1st June and the last on 4th July. In addition to forecasts of weather and visibility there were also warnings of storms of Force 10 or more when appropriate. Such warnings were in fact issued on more than one occasion. As from 14th June ice reports were added to the forecasts. These were merely repetitions of the U.S. Coastguard reports received daily from Argentia. The ice was of course further west than 40°W, but it turned out that the yachts were better able to receive the information by relaying it from the United Kingdom.

In the early stages of the race the competitors were able to use the normal BBC Shipping Forecasts issued four times daily, together with any gale warnings for the coastal sea areas up to 15°W. Two of these Forecast Bulletins are also broadcast by radio-telephone from GPO coastal radio stations and so are the gale warnings.

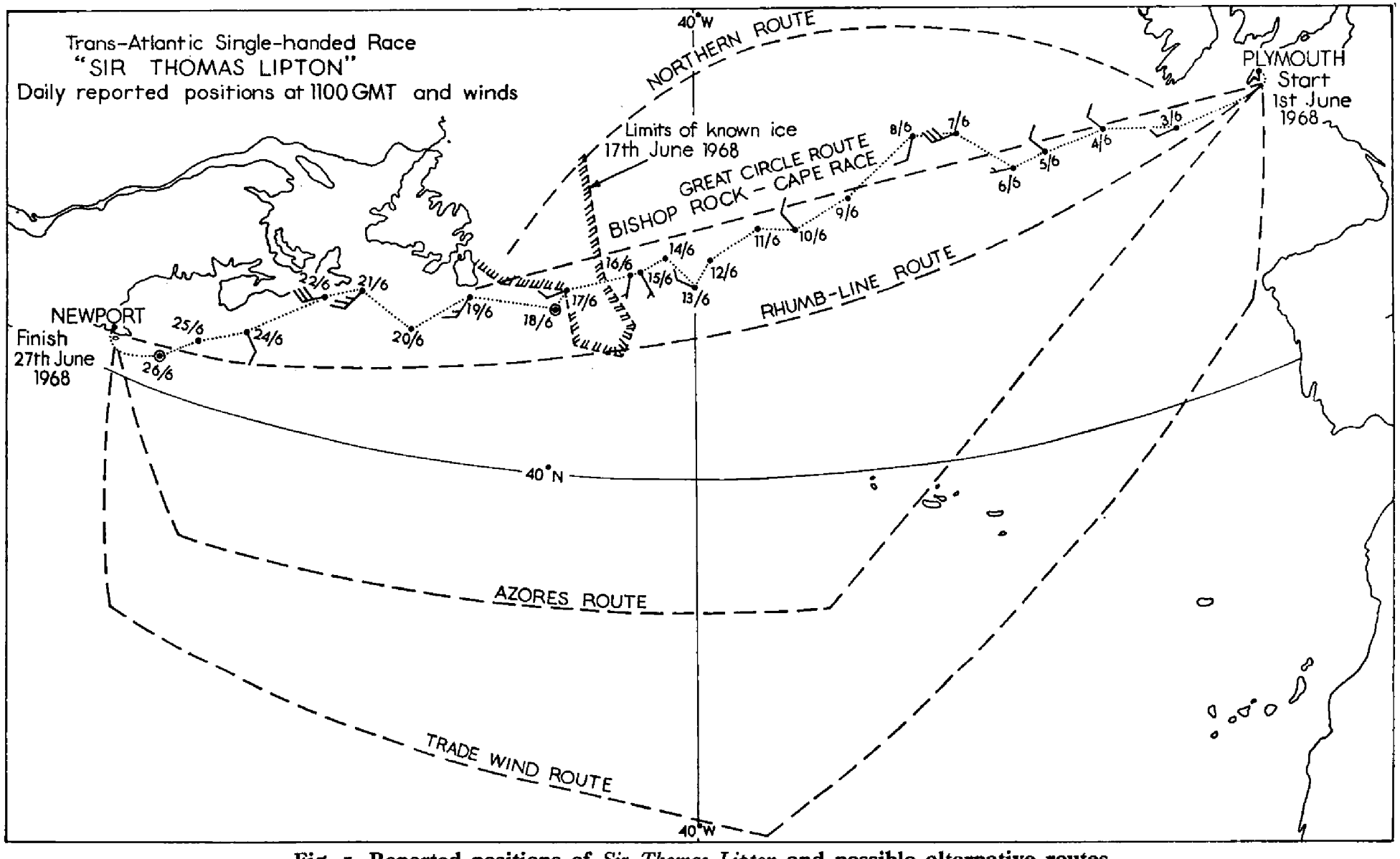


Fig. 1. Reported positions of *Sir Thomas Lipton* and possible alternative routes.

There was no need, therefore, to lay on anything special for the coastal areas of the British Isles. It was when the yachts got out of range of the BBC and GPO coastal stations that the special radio-telephone broadcasts of the oceanic area came into their own. No matter how good he is at morse, it is a major task for a lone navigator aboard a yacht in such circumstances to take down the Atlantic Weather Bulletin.

There has been a good deal of publicity in the national press and elsewhere regarding the use of computer forecasts by the winner of the race, Geoffrey Williams, in the mono-hull yacht *Sir Thomas Lipton*. The method used to obtain the best course to steer was not dissimilar from that used by the Meteorological Office in its standard ship-routeing service and was based on the same weather forecasts.

To understand the method it is necessary to digress for a moment to describe what weather forecasts were available and to show how these may be used to predict the yacht's speed.

The forecasts were supplied to the order of English Electric Ltd. for use on their KDF 9 computer in the form of exact copies of the forecasts produced in the Meteorological Office on their own KDF 9 computer for normal forecasting purposes. Actually the forecast was unconventional since it was on a magnetic tape. It was taken by car from Bracknell to London each day. The tape contained values of predicted wind speed and direction at 1,927 positions in the northern hemisphere at 6-hourly intervals up to 48 hours ahead. It also contained other data not required by the English Electric computer, but the computer was programmed to pick out the parts it needed.

In order to apply the forecasts to the yacht it is clearly necessary to know her performance in various wind conditions. These will be clear from Fig. 2 which shows how this particular yacht's speed varies with angle of wind off the bow in winds of various forces.

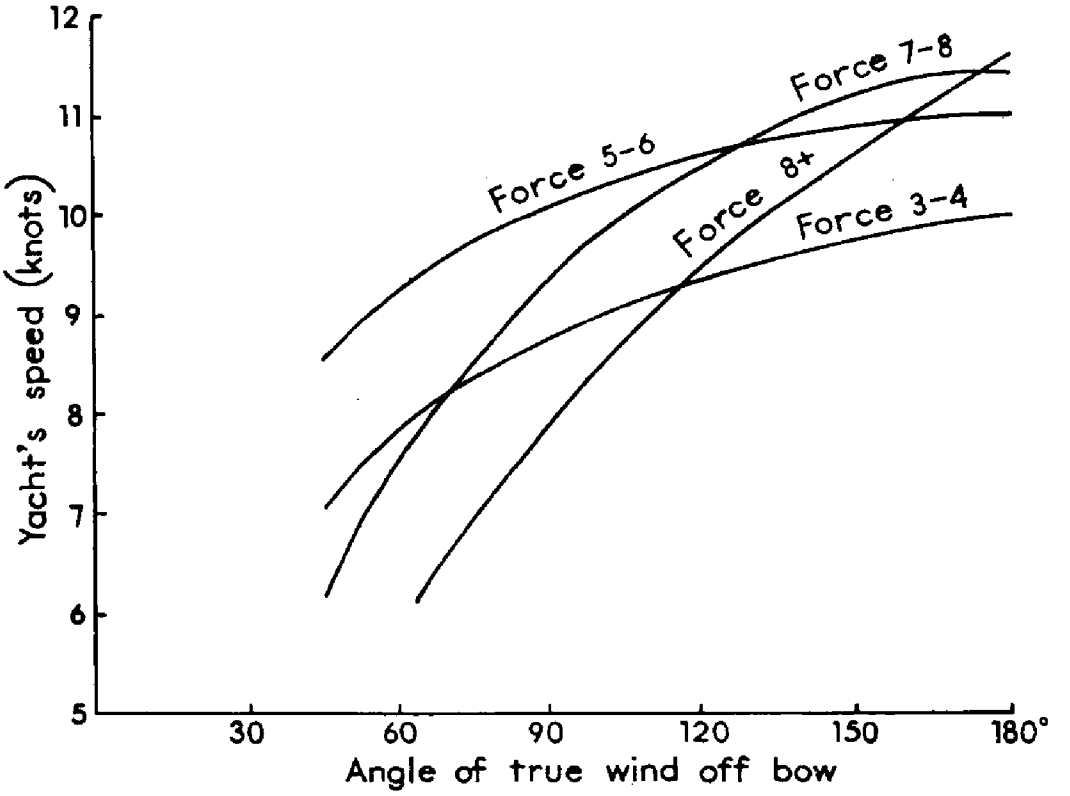


Fig. 2. The yacht's performance.

It would be inappropriate in an article of this sort, dealing with weather forecasting for an Atlantic race, to attempt to deal in any sort of detail with the manner in which English Electric computed the most favourable courses from the weather

forecasts. Anyone interested may be referred to an article by Slater.[1] It will be clear however that it is quite practicable to use the predictions to work out the speed of the yacht on various courses if one knows the position of the yacht and consequently to arrive at estimates of the distance she will travel in the next 40 hours or so; some time is lost in transit and in the production of the forecasts and other computations. It will also be necessary to impose certain limitations on the course, as the computer might otherwise recommend a course leading into land, ice or the strongest part of the unfavourable North Atlantic Drift. So Williams was usually given a choice of the best three courses selected from about 150 by the computer. There was one other safeguard: the Meteorological Office Ship-Routeing forecaster was asked to confirm that the chosen courses were reasonable in the light of the very latest predictions of conditions in the North Atlantic.

This last check shows an awareness of the great importance of the weather forecast. In fact, without in any way detracting from the performance and judgment of the yachtsman, who has the ultimate choice, it is the accuracy of the weather forecast on which this and any other weather-routeing project hangs.

None are better aware than the forecasting staff of the Meteorological Office that their predictions are not always right. But it is a matter of satisfaction that the forecasts predicted by its computer were sufficiently accurate to assist in the winning of the trans-Atlantic race.

Many readers will no doubt be aware that the Meteorological Office offers a ship-routeing service for ships engaged on the North Atlantic trade. The success of Geoffrey Williams aboard the *Sir Thomas Lipton* provides an unusual illustration of the value of such routeing; the underlying weather forecasts are the same as those used in the routeing of merchant ships.

Fig. 1 shows the positions of the yacht, as reported at the time. There is some doubt about those for 7th and 8th June. It will be seen that changes of course, dictated by the variability of the weather, were numerous.

The cynics will no doubt say that the *Sir Thomas Lipton* would have won anyway and that, of course, cannot be denied. However Slater[1] quotes Williams as follows: "I think, with the exception of one day, they [the computed courses] have been accurate all the way from when we started using them just west of the Scilly Isles. The best bit of planning was when I was routed north of a severe depression and got the favourable easterly following winds while those who were 50 or 60 miles south of me had Force 10 winds in their faces." He ought to know.

REFERENCE

1. SLATER, I. KDF 9 proves a winner for *Sir Thomas Lipton*. *Computer Weekly*, No. 94, 1968, p. 6.

551.506.7:551.507.23

Upper-air Observations from a Merchant Ship

By W. J. Cox

(Mr. Cox was the senior of the two meteorologists who sailed aboard *Sugar Exporter*. He previously did ten voyages in weather ships and did radiosonde observations aboard R.R.S. *Discovery* during a seven-month voyage in the Indian Ocean in 1964.)

In the January 1967 issue of *The Marine Observer* details were given of the proposed World Weather Watch and of the important role which ships' observations will take in the plan. In addition to surface observations it is hoped that a number of merchant ships can be equipped to make radiosonde investigations of the upper air. These are considered especially important in the southern oceans where the present network of radiosonde stations is sparse.

Such observations have been carried out from Ocean Weather Ships for many years but these vessels are specially equipped for that purpose and everything is done to facilitate the work of the meteorologists. When fitting out a merchant ship to carry out the same function three aims are considered important:

(*a*) No interference with the normal running of the ship.
(*b*) Instruments and equipment to be as compact and portable as possible.
(*c*) Meteorological staff to be kept to a minimum. (It has always been understood that meteorologists will need to be aboard the ship to do this work.)

To investigate the feasibility of the proposed scheme, the British Meteorological Office, in co-operation with Sugar Line Ltd., commenced trials aboard m.v. *Sugar Exporter* in January 1968. The *Sugar Exporter* is a bulk carrier, overall length 559 feet, of 11,687 gross tonnage (*see* photograph opposite page 192). During the period of the trials she was commanded by Captain A. F. Lunn. As a Selected Ship she is fitted with meteorological instruments to that standard and a radio-facsimile recorder is carried for receiving weather charts.

One return voyage from London to Trinidad was made in January/February, followed by another in February/June from London to Corpus Christi, Texas, thence to Kandla, India via Durban and Mombasa, returning to London via Lourenço Marques and Cape Town. Altogether the trials extended over six months and some 37,500 miles were travelled. During the Trinidad voyage balloon ascents were carried out at 0001 and 1200 GMT each day but during the second voyage no soundings were made within 200 miles of other radiosonde stations and midnight soundings were considered unnecessary in the tropics. Both voyages are shown in Fig. 1, together with positions and dates of the midday ascents.

Two meteorologists were appointed to carry out the trials, being accommodated in cabins amidships, under the bridge, formerly occupied by junior officers. One of these cabins was also converted to an Operations Room by the simple installation of two radio-receivers, a tape recorder and a control screen. The latter is used for re-calibrating the sondes before flight. A small electrical converter was also necessary to provide alternating current. Helium was used to carry the balloons aloft and this was carried in cylinders, each of 240 cu. ft capacity. The maximum number carried at one time was 85 and these were stowed, in racks, in the midships mast-houses. Additional racking for 'ready use' cylinders was fitted right aft.

The radiosondes selected for use are manufactured in West Germany and are referred to as Grawsondes, after Dr. Graw who is responsible for their development. With this type of sonde the information is transmitted in the form of morse signals. An electrically-driven rotating cylinder is contacted by pointers controlled mechanically by each of the meteorological elements, temperature, pressure and humidity. This drum is rotated eccentrically in such a way that each pointer is brought into contact with it for a fraction of a revolution only, thereby increasing the accuracy of the measurements. On the surface of the drum are two bands of polished contacts. The combination of these permit signals from 00 to 99 to be transmitted

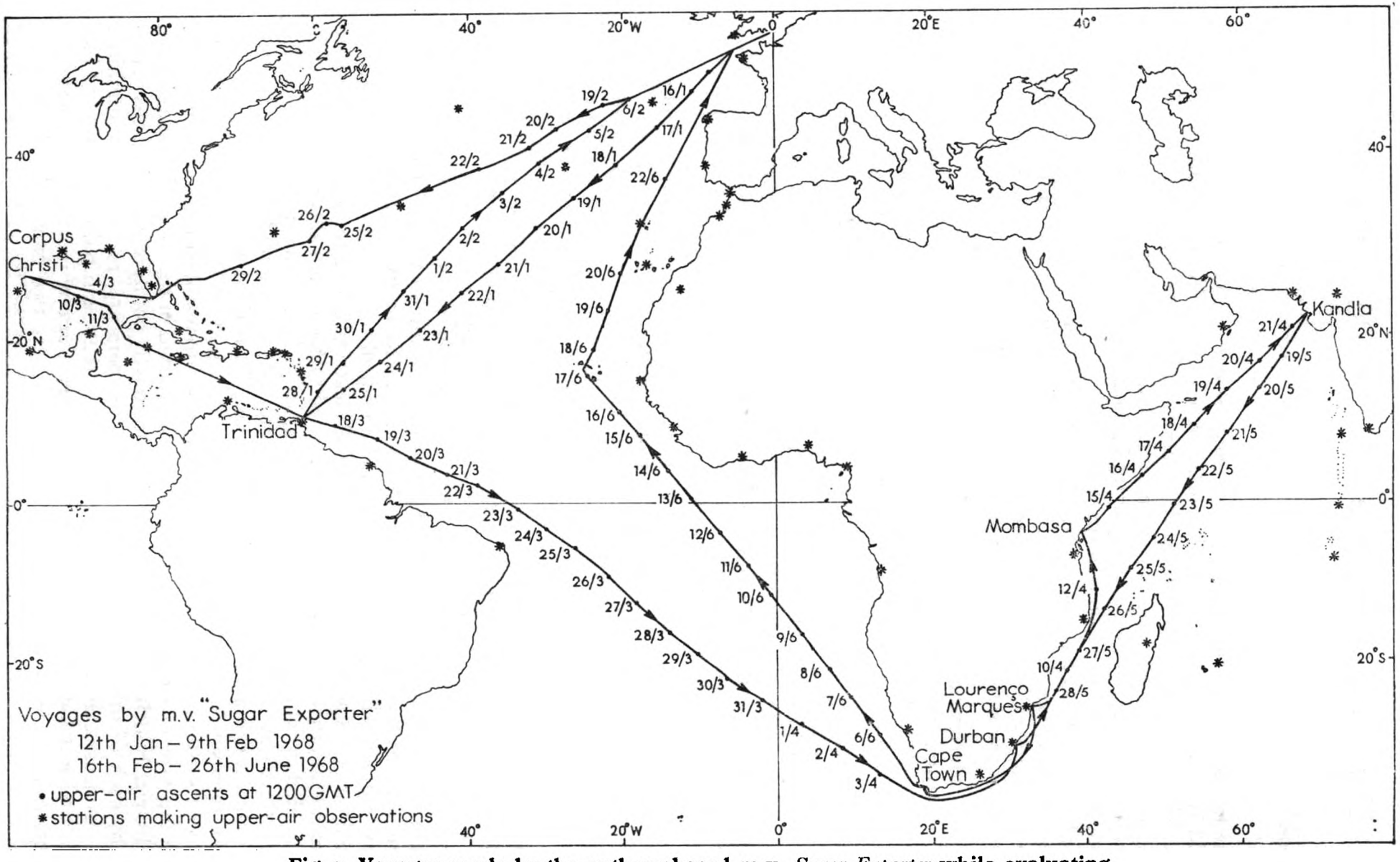


Fig. 1. Voyages made by the author aboard m.v. *Sugar Exporter* while evaluating the possible introduction of upper-air observations from merchant ships.

five times across the width of the drum, sufficient to cover the range of each meteorological parameter. Five-hundred grooves are inscribed around the circumference of the drum to prevent the pointers altering position during transmission of a signal. Transmission is in the form of intermittent CW signals on a pre-set frequency of 27·55 mc/s and so can be picked up on most short-wave receivers Power is supplied by a 4·5 volt battery. The instrument is contained in a moulded polystyrene case and the total weight, complete with battery, is a mere 620 grams

This sonde was chosen in preference to those normally used by the Meteorological Office because the only essential item of ground equipment is a simple radio receiver, whereas, with the Met.O. Mk.2b radiosonde, sophisticated automatic receiving apparatus has been developed which takes up much space and requires considerable electronic knowledge to maintain. Also the Grawsonde weighs less than half the other type and therefore less gas is necessary to carry it aloft. Another advantage, found during the trials, is that the computation of data received from the Grawsonde is less involved.

It is important that the sonde, when in flight, be positioned some distance below the balloon, otherwise local heating from the balloon affects the recorded temperature. On occasions of comparative calm it was possible to achieve this by letting the balloon up on a length of twine before releasing the sonde. On most occasions, however, it was necessary to use an unwinder device. This enables one to launch the balloon and sonde together and during the first minute or so the weight of the sonde pulls out the suspension until it attains the required position in relation to the balloon. When within 200 miles of land, or in areas of dense shipping, a parachute was fitted to the rig to slow the descent of the sonde after the balloon burst.

Amidship stowage of the helium cylinders was arranged as it was thought that the launching of the balloons would normally be done amidships (except when the ship was heavily laden, in rough weather) because of the good lee provided by the bridge house and the 6-foot-high hatch coamings immediately abaft it and because of the proximity of the site to the operations room. During the voyage to Trinidad it was found that launching from this area was only practicable in light relative winds; the ship's speed of 13 knots augmented the actual wind and eddies from the midship superstructure tended to carry the rig back inboard. A canvas screen to provide additional shelter and a large net to assist in steadying the balloon during and after filling it were available but proved of little value. After the first voyage, on most occasions, filling and launching were carried out from the mooring deck aft which is a deck above the main deck and where the superstructure and the overhang of the boat deck provided shelter from winds forward of the beam (*see* photograph opposite page 192). The site amidship was only used on occasions when the wind was from abaft the beam. During the actual filling two people were normally required to steady the balloon. In winds of over Force 6, volunteered assistance from the ship's personnel was very welcome, especially during the period when it was necessary for one person to leave the balloon to turn off the helium. In future it is hoped to provide a means of controlling the helium supply at the 'filler' end of the hose. In almost all cases it was impossible to measure the free-lift accurately, so the size of the balloon was the determining factor.

Having selected the site, one person steadied the balloon, keeping it off the deck to avoid getting grease and oil on it and also because, in the tropics, a steel deck becomes very hot. The other person turned on the gas and returned as quickly as possible to help steady the balloon; when it was judged big enough he rushed back to the cylinder to turn off the gas.

Before leaving the operations room the radio receiver was tuned to the appropriate frequency and the tape recorder left running. This was not always successful in picking up initial signals and whenever possible the launch of the balloon would be delayed long enough for one meteorologist to get back to the operations room and retune the receiver. For operational purposes the first few minutes of the ascent were recorded on the tape recorder and thereafter the message was received aurally

by loudspeaker. The tape recorder was kept in operation throughout, however, so as to have a check on irregularities such as inversions and humidity fluctuations. At night, the monitoring earphone of the tape recorder was used so as not to disturb 'the neighbours'.

During the first voyage 39 radiosonde observations were made and 95 during the second voyage. The average height attained during the ascents was about 21,300 metres, the maximum being about 28,660 metres. On average it was found that it took something over 3 hours to do each radiosonde ascent, including preparation for launching, and the calculation and coding of the result.

On Ocean Weather Ships, investigation of upper winds is carried out using special radar equipment. This was not available on the *Sugar Exporter* but some attempts were made to track the balloon visually, measuring elevations by sextant and obtaining bearings from the gyro compass. Results were very good on the few occasions this was possible but cloud cover restricted the use of this method most of the time. The Chief Officer tracked the balloon on each occasion, mostly following it to bursting point. Attempts by the meteorologists at using the sextant were not at all successful.

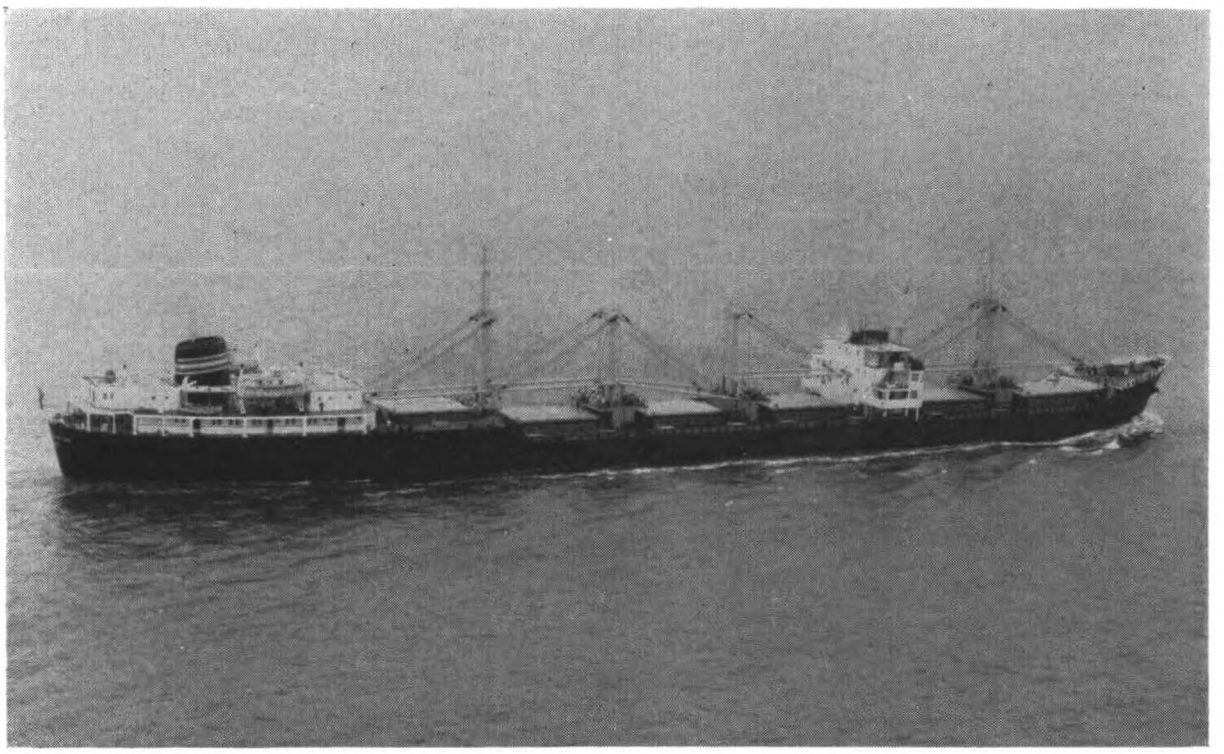
It is regretted that unavoidable extra work was placed upon the Radio Officer. After computation the results of each ascent was coded into message form and transmitted to the appropriate shore receiving station. Each message consisted of approximately 90 five-figure groups. If full benefit is to be derived from these observations it is important that they should reach the forecasting centres as soon as possible. Despite occasional difficulty in contacting the shore stations, the Radio Officer cleared all messages with very little delay.

The voyage to Trinidad was quite uneventful but on the Atlantic crossing to Corpus Christi much bad weather was encountered, the worst being just west of Bermuda when winds reached storm force. This was ideal for testing the meteorological equipment but the 'weathermen' began to be regarded as a couple of Jonahs. However, apart from the three crossings of the Inter-tropical Convergence Zone and both roundings of the Cape, very little bad weather was experienced for the remainder of the voyage so they did not become too unpopular. Indeed, both meteorologists are very grateful to Captain Lunn, his Officers and crew for their hospitality and assistance. Working to a GMT schedule aboard ship is awkward, especially at meal times. However, the Chief Steward and his staff were very helpful and it is hoped that they were not put to too much inconvenience. The same applies to the Bos'n and his men who assisted by moving helium cylinders around.

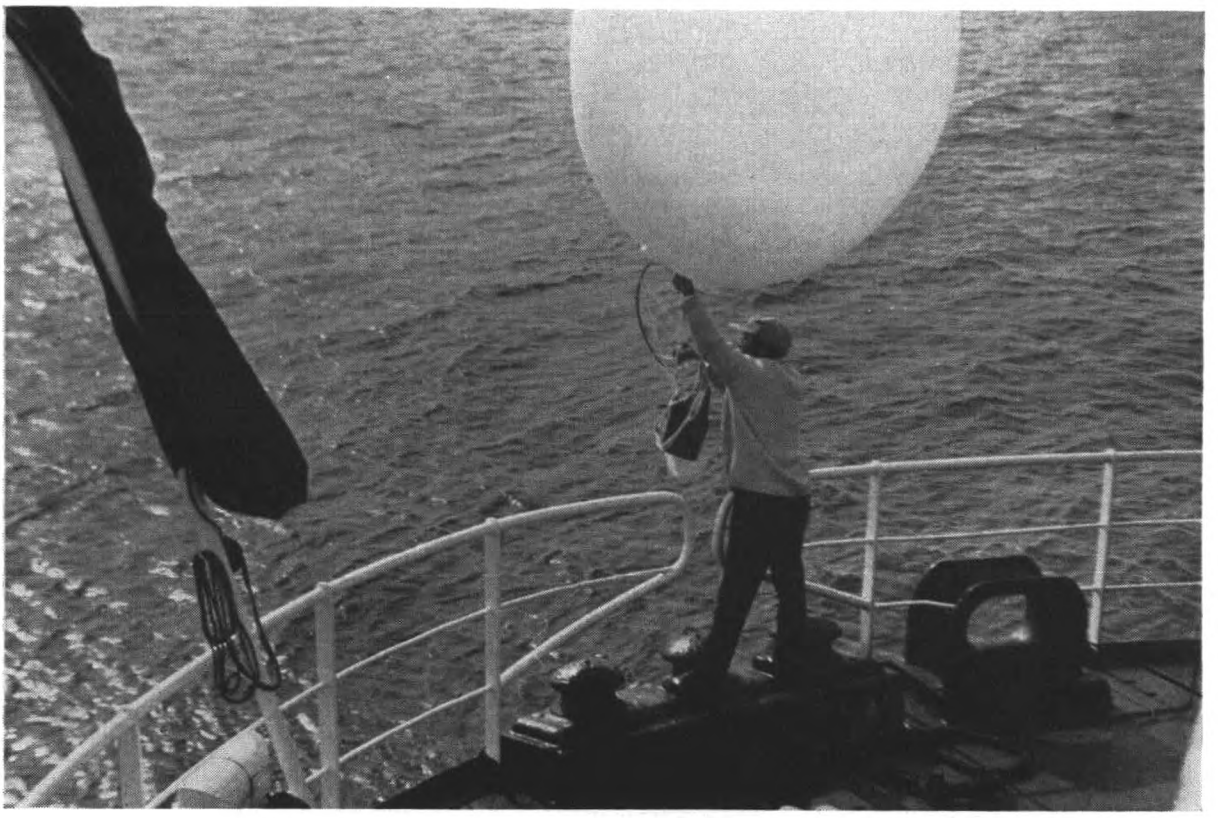
Meteorologically, the trial proved very interesting and much useful information was obtained. From a personal point of view, the writer improved his ability at bridge and liar dice and fully enjoyed the whole experience.

Editor's note. The United Kingdom hopes to equip up to 10 merchant ships for making upper-air observations during the first four years of World Weather Watch (1968–1971).

(*Opposite page* 192)



m.v. *Sugar Exporter* (*see* page 189).



Mr. Cox ready to launch a balloon (*see* page 189).

(*Opposite page* 193)

Captain R. G. Edwards, Master of m.v. *Rhexenor*, receiving the ship's award.

Captain J. F. Scott, Master of m.v. *Kooringa*, receiving his personal award.

Mr. A. K. Hannay, Regional Director for Victoria of the Commonwealth Bureau of Meteorology, presenting Australian Excellence Awards for 1966 in Melbourne (*see* page 201).

551.507.22:627.95

Air-Sea Rescue at Ocean Station 'Kilo'

By Captain N. Fraser
(Master, Ocean Weather Ship *Weather Reporter*)

To the captains and crews of trans-oceanic aircraft, as to the many thousands of passengers carried annually by this modern means of travel, the words 'air-sea rescue' must at times give rise to some thought. In fact many are bound to say to themselves "If we have to ditch will the ditching be successful and will we be picked up afterwards?".

Yet, to the men of the Ocean Weather Service, air-sea rescue is one of the main reasons for their being stationed in the North Atlantic and although, fortunately, these services are seldom called upon, the fact that they are available must give some measure of comfort to those flying over that ocean.

By international agreement all the weather ships carry special search and rescue equipment and essential medical aids and their crews are "expertly trained in effecting sea rescues". To make certain that there is some standard method of procedure to cope with such emergencies, air-sea rescue drills and mock ditchings, the latter usually in conjunction with aircraft of RAF Coastal Command, have been consistently carried out aboard the British weather ships during their 20 years in service.

During the early hours of Saturday, 30th March 1968, in darkness and with a rising wind and sea, O.W.S. *Weather Reporter*'s services were called for in earnest while she was on Station 'Kilo' in latitude 45°N, longitude 16°W. The aircraft in trouble was no jet airliner 'down to her marks' with business executives, Hollywood starlets and glamorous air hostesses on board, but a single-engined, four-seater plane piloted by a lone flier—truly a Mollison or Lindbergh of the space age—bound from Miami, Florida to Germiston, South Africa via Gander (Newfoundland) and the Azores.

This pilot, due to consistently bad weather and complete instrumental failure, had latterly become very uncertain of his position; with no means of ascertaining it, together with an ever-dwindling supply of fuel, he finally decided to put out a distress call on the radio-telephone. This was intercepted at 0128 GMT and relayed to *Weather Reporter* by an American military aircraft.

Aboard *Weather Reporter* ditching and air-sea rescue procedures were immediately put into operation. The wireless and radar rooms were fully manned, steam raised on the second boiler against full speed being required, boats uncovered and boat engines warmed through, while the high-speed motor inflatable life-raft was got ready, hoisted and swung outboard.

In the meantime two aircraft of the United States Air Force Rescue Unit, based on the Azores, were homing on the distressed aircraft which had been identified at 0223 GMT by *Reporter*'s wireless direction-finding equipment and picked up by the ship's main radar on a bearing of 260 degrees at a distance of 48 miles.

On the ship's bridge a plot was started and a suitable ditching heading considered. The wind at the time was from due north at 23 knots with a corresponding sea, and the swell was from 340 degrees with a height of 15 feet. It was therefore decided that the best ditching heading would be 070 degrees, i.e. parallel to the swell while giving some component of head wind. This was communicated to and agreed by the rescue aircraft.

Accordingly, a flare path consisting of 20 McMurdo sea-water-activated electric lights was laid along this track over a distance of one mile. The ship was then turned away to port from the flare path and brought round so that she was stopped in a position some 300 yards in from the end and 200 yards to windward and heading towards it. By occasional astern movement of the engine she was held in this position while awaiting developments.

Meanwhile the Rescue Unit aircraft were approaching the vicinity and the Commander of the Unit, who had now taken over the ditching arrangements, discussed with the pilot in distress whether it would not be better to get some 100 miles to the eastward where surface conditions were considered to be much smoother. However, it was decided that the ditching would be made close to *Weather Reporter* but, to give some smoothing of the water, she would steam at maximum speed on the ditching heading, in line with the flare path, and the aircraft would ditch in the vessel's wake. The ship was put on a course of 070 degrees at full speed while the distressed aircraft, escorted on either side by the rescue planes, moved in astern for the final approach. By 0333 hours they were some 4 miles astern at about 1,500 feet and a succession of illuminating rockets was fired from the ship. The starboard motor lifeboat was now manned with engine running and gripes cast off, while the motor life-raft crew were also at their stations with the Chief Officer as coxswain.

It was at this point that an interruption occurred in the organized plan. When checking his door in order to be certain he could get out quickly, the pilot found it was jammed. The Rescue Commander immediately told him to gain some altitude, endeavour to free his door, and then make another run in. The pilot succeeded in freeing his door but was now some distance from the ship with the rescue planes as close escort. In turning to get into position for another approach the pilot found himself right down on the surface and ditched some $4\frac{1}{2}$ miles due south from the *Weather Reporter*. The time was now 0352 GMT. All this was observed on the ship's radar and she was immediately put on to a course of 180 degrees.

Still at full speed, with main and Decca radars manned, main and bridge wing searchlights trained and all available hands posted as lookouts, the ship rapidly closed the ditching position. Several surface flares had been dropped by the rescue planes to mark the location of the ditching but, with wind now increased to 30 knots and gusts well in excess of that figure and a correspondingly high sea, these soon became widely spaced.

A systematic search was made through and close to these flares but, when no trace of the survivor could be found, the rescue aircraft, aided by their own surface searchlights, finally formed a close triangle of three flares round him. The ship was steamed slowly through this triangle and at 0514 hours the pilot in his life-raft was sighted in the glare of the ship's searchlights some 200 yards off and fine on the lee (starboard) bow.

It was then that a cheer went up from all hands on *Weather Reporter* which would have put the famous 'Hampden Roar' in second place and which made one realize how worthwhile all the drills over the years had been.

The ship was manoeuvred and stopped with the survivor some 50 yards to leeward and abreast of the bridge. The motor life-raft was lowered and sent away, manned by the Chief Officer and two Able Seamen, one of the latter also operating the walkie-talkie radio. In exactly six minutes from the time of launching the life-raft the survivor was aboard *Weather Reporter* and in the charge of the first-aid party. The rapidity with which this final stage of the rescue was carried out gives conclusive proof of the extreme usefulness of the high-speed motor inflatable life-rafts recently supplied to the four British Weather Ships.

Apart from a couple of minor scratches the rescued pilot, Mr. Robert Whatley, came through his very unpleasant and unexpected adventure unhurt. He was made a guest of *Weather Reporter*'s wardroom where he was suitably entertained until the following Monday morning when he was transferred at sea to m.v. *Ebro* of the Royal Mail Lines for a passage to Liverpool.

Thinking back over this incident, to the staff manning the wireless room and to those of us on the bridge who heard all the radio voice communications, there is no doubt that Mr. Whatley's calm and unperturbed manner throughout contributed in no small way to the success of his ditching and rescue.

Last, but by no means least, the advice and ditching talk-down by the rescue aircraft was a really fine example of highly trained skill and co-ordination.

PRESENTATION OF BAROGRAPHS

As announced in the October 1967 number of *The Marine Observer*, four barographs were awarded to shipmasters for long and zealous voluntary service on behalf of the Meteorological Office, this being the twentieth year in which these special awards have been made.

Only once in the twenty years, namely 1956, has it been possible to bring the four shipmasters together in the one place at the one time, and this year's presentations had again to be spread over two ceremonies.

On 4th January 1968 Captain K. Barnett R.D. and Captain C. P. Robinson of the New Zealand Shipping Company, accompanied by Mrs. Barnett, Mrs. Robinson, Captain J. Davies, Assistant Marine Superintendent of the Company and Mr. D. R. Archer of the management, came down to Bracknell to receive their barographs. The third recipient was Captain W. F. T. Dan, also of the New Zealand Shipping Company, but he had been called away to an extended voyage shortly before and the award was received on his behalf by Captain Davies.

In making the presentations over a glass of sherry, Dr. B. J. Mason, F.R.S., Director-General of the Meteorological Office, mentioned the long and honourable record of voluntary service for us which the company held, going right back to 1855 when the Meteorological Office itself was less than a year old. Today, 29 of their ships were on our voluntary observing list and the standard of their observations was brought out by the fact that not only this year and last had 16 of them qualified for annual awards, but that these three presentations brought the number of barographs presented to shipmasters in the Company up to 22 in the twenty years.

Taking a look ahead, Dr. Mason said that it was not in the foreseeable future that the value of ship's observations would ever decrease in spite of the march of science, meteorological satellites, etc. In fact it could be said that they were taking on a new importance now that the computer was with us by which we were able to take in and process a virtually unlimited amount of data. Already at sea was a voluntary observing ship carrying two meteorologists and equipment to take upper-air observations and it was hoped to extend this scheme; another part of Great Britain's contribution to the World Weather Watch would be to endeavour to recruit more ships to the voluntary observing fleet.

The first meteorological logbook sent in by each captain, together with his personal record card, was displayed, Captain Barnett's going back to 1937, Captain Dan's to 1948 and Captain Robinson's to 1946, and afterwards the party took luncheon with the Director-General and senior officers of the Meteorological Office branches mainly concerned with ships' observations. Later, the visitors were shown the work of the Office.

Captain N. F. Fitch, M.B.E., of the Bibby Line, accompanied by Mrs. Fitch, came to Bracknell to receive his barograph from the Director-General on 18th April 1968.

In making the presentation Dr. Mason mentioned that here again was a company with a long and honourable voluntary observing record: it went right back to 1856 when we received a meteorological logbook from the *John Bibby* and today all but one of their 12 ships were observing for us. Captain Fitch was the second of their shipmasters to receive a long-service award.

To see Captain Fitch's first meteorological logbook, going back more than 40 years when he was in the Federal 'P' Line's *Pareora*, together with his record card,

was of particular interest to Mrs. Fitch and afterwards they were entertained to luncheon and a tour of the office.

Photographs taken at the presentations appear opposite page 184 and the announcement of the awards to be made next year is on page 200.

L. B. P.

NOTES ON ICE CONDITIONS IN AREAS ADJACENT TO THE NORTH ATLANTIC OCEAN FROM APRIL TO JUNE 1968

APRIL

Although the general atmospheric circulation over the northern hemisphere followed roughly the same pattern, pressure over the central and western parts of the North Atlantic was not nearly so low as usual. It was, however, significantly lower over north-east Canada and over northern Norway. As a result exceptionally strong winds prevailed, southerlies over the Davis Strait and Baffin Bay and north-north-easterlies over the Greenland Sea. Relatively strong winds affected the Baltic, White Sea and south-eastern parts of the Barents Sea.

Greenland Sea. The outstanding feature was the great excess of ice between Jan Mayen and Iceland, the pack stretching as far south as the island itself. It even spread eastwards and southwards along the Icelandic coast and extended further than recorded in April for many years. Curiously enough the ice tended to be deficient in some places north of Jan Mayen where it was thought that a gyre of somewhat warm and saline water from the North Atlantic Current undercut the pack.

Baltic. Here the melting season was, as estimated, at least three weeks ahead and the whole area was unusually clear by the end of the month except for a few patches of thick winter pack persisting in the open sea off the northern parts of Lulea and Kemi.

Great Bank and St. Lawrence area. The complete and early clearance of the ice in the Gulf of St. Lawrence was also unusual and this contrasted with the Belle Isle area where the pack extended further eastwards than normal.

Other areas. Ice amounts were approximately normal.

MAY

Pressure was generally very much higher than usual across Iceland, Greenland and over the Bering Sea but significantly lower just north of the Great Bank of Newfoundland and over the Kara Sea. Although winds over the Arctic were at times extremely variable the overall anomalies for the month resulted in its being colder than usual over most of the Greenland, Norwegian, Barents and Kara Seas and also over the Canadian Arctic Archipelago.

On the other hand the Okhotsk, East Siberian and Beaufort Seas were relatively warm, the latter being to the disadvantage of the British Trans-Arctic Expedition en route from Point Barrow to the Pole.

Greenland Sea. As in April there was a great excess of ice round Iceland, the Denmark Strait being completely blocked with pack which also spread southwards along the east coast in a way previously unknown this century. Navigation was seriously impeded and one vessel at least, the *Katarina*, was damaged by ice off Djúpivogur. Hornafjördhur, further south, was indeed closed by the pack as late as the middle of the month. South-west of Spitsbergen, however, sea temperatures were not as low as usual so there was, if anything, a slight deficiency of ice.

Barents Sea. In the northern part there was the paradox that although the sea itself was on the warm side, ice was more extensive than usual and was found up to 100 miles south of its normal May limit. Nearer the south-west coast of Novaya Zemlya and Gulf of Pechora ice was deficient.

Western Atlantic and Davis Strait. The circulation over the western Atlantic caused the pack and icebergs off the southern coast of Labrador to drift, in the middle of the period, much further eastwards than usual, although the pack, if not the icebergs, had retreated by the end of the month. By the same mechanism, ice near Cape Farewell in southern Greenland moved westwards out into the Davis Strait up to 130 miles beyond its average position for the time of year.

Baltic. Ice in the Gulf of Bothnia decayed very rapidly and had almost gone by the end of the month, somewhat ahead of normal.

Other areas. Ice amounts, movements and development were in no way remarkable.

Table 1. Icebergs sighted by aircraft and merchant ships within latitudes 40°N–65°N and longitudes 40°W–65°W

(*This does not include growlers or radar targets*)

Limits of Latitude and Longitude		Degrees North and West												
		66	64	62	60	58	56	54	52	50	48	46	44	42
Number of bergs reported south of limit	April	>1690	>1689	>1282	>1110	>1071	>915	>763	>633	>589	>160	>41	0	0
	May	>998	>996	>981	>978	>978	>946	>943	>884	>572	>178	>68	10	0
	June	>534	>534	>534	>534	>534	>519	>483	>461	>332	>165	>16	4	0
	Total	>3222	>3219	>2797	>2622	>2583	>2380	>2189	>1978	>1493	>503	>125	14	0
Number of bergs reported east of limit	April	>1690	>1690	>1689	>1642	>1475	>1385	>1226	>1162	>573	>236	25	0	0
	May	>998	>998	>998	>998	>966	>966	>857	>338	>198	>74	1	0	0
	June	>534	>534	>534	>522	>494	>447	>333	>225	>155	>89	>14	1	1
	Total	>3222	>3222	>3221	>3162	>2935	>2798	>2416	>1725	>926	>399	>40	1	1
Extreme southern limit	April	44° 04′N, 49° 16′W on 28.4.68												
	May	43° 21′N, 47° 53′W on 16.5.68												
	June	43° 27′N, 48° 26′W/48° 36′W on 18.6.68												
Extreme eastern limit	April	48° 23′N, 44° 49′W on 16.4.68												
	May	45° 05′N, 45° 21′W on 23.5.68												
	June	45° 58′N, 41° 08′W on 19.6.68												

> ('greater than') has been inserted where there is some doubt as to the actual number of icebergs at some of the sightings, but the true value is probably greater than the value given.

Extreme limits during the 3-month period are underlined.

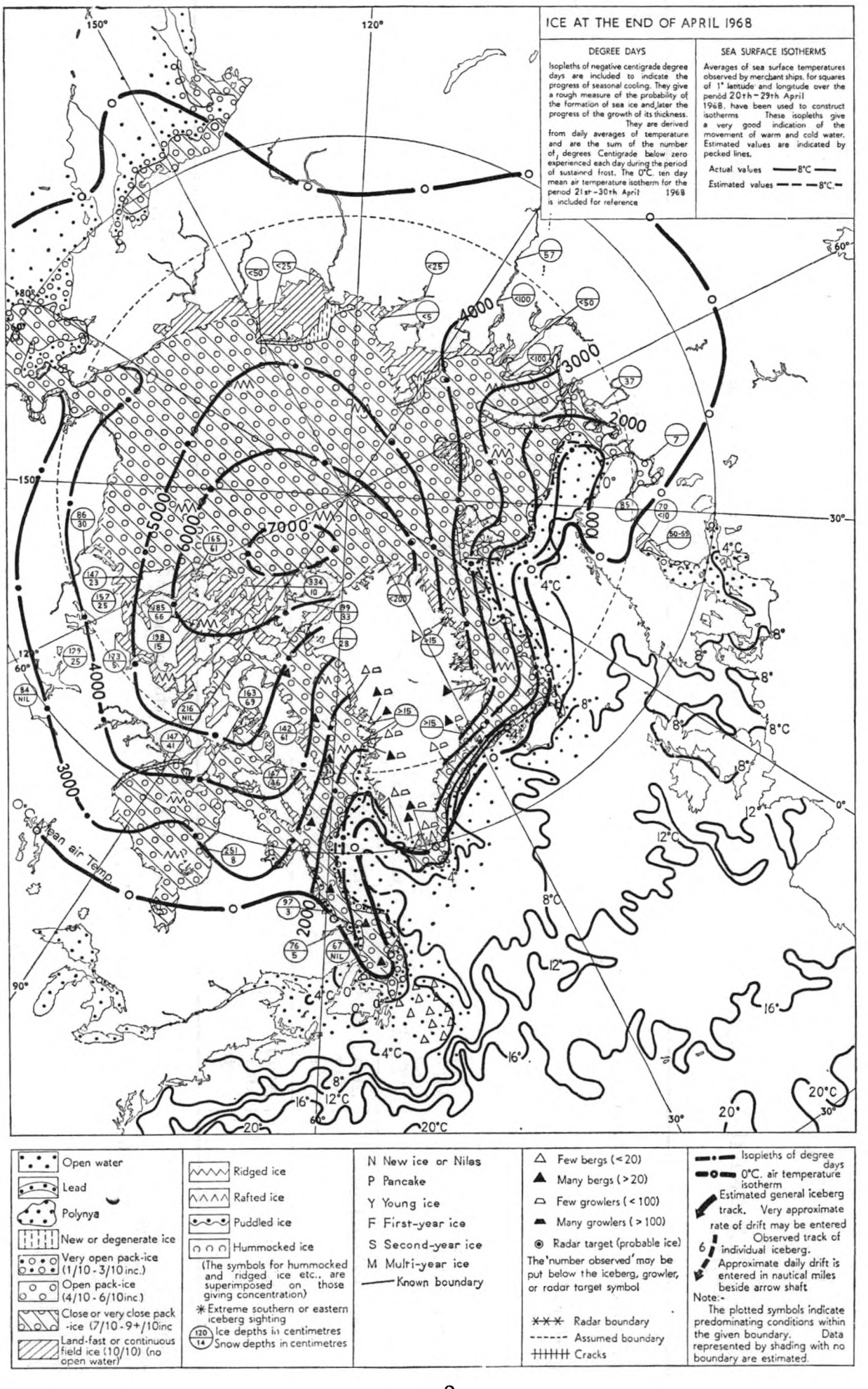

ICE AT THE END OF APRIL 1968
DEGREE DAYS
Isopleths of negative centigrade degree days are included to indicate the progress of seasonal cooling. They give a rough measure of the probability of the formation of sea ice and later the progress of the growth of its thickness. They are derived from daily averages of temperature and are the sum of the number of degrees Centigrade below zero experienced each day during the period of sustained frost. The 0°C. ten day mean air temperature isotherm for the period 21st–30th April 1968 is included for reference
SEA SURFACE ISOTHERMS
Averages of sea surface temperatures observed by merchant ships, for squares of 1° latitude and longitude over the period 20th–29th April 1968, have been used to construct isotherms These isopleths give a very good indication of the movement of warm and cold water. Estimated values are indicated by pecked lines.
Actual values —8°C—
Estimated values – – –8°C.–
Open water
Lead
Polynya
New or degenerate ice
Very open pack-ice (1/10 - 3/10 inc.)
Open pack-ice (4/10 - 6/10 inc.)
Close or very close pack -ice (7/10 - 9+/10 inc
Land-fast or continuous field ice (10/10) (no open water)
Ridged ice
Rafted ice
Puddled ice
Hummocked ice
(The symbols for hummocked and ridged ice etc., are superimposed on those giving concentration)
Extreme southern or eastern iceberg sighting
Ice depths in centimetres
Snow depths in centimetres
N New ice or Nilas
P Pancake
Y Young ice
F First-year ice
S Second-year ice
M Multi-year ice
Known boundary
Few bergs (< 20)
Many bergs (> 20)
Few growlers (< 100)
Many growlers (> 100)
Radar target (probable ice)
The number observed may be put below the iceberg, growler, or radar target symbol
Radar boundary
Assumed boundary
Cracks
Isopleths of degree days
0°C. air temperature isotherm
Estimated general iceberg track. Very approximate rate of drift may be entered
Observed track of individual iceberg.
Approximate daily drift is entered in nautical miles beside arrow shaft
Note:-
The plotted symbols indicate predominating conditions within the given boundary. Data represented by shading with no boundary are estimated.

Table 2. Baltic Ice Summary: April–June 1968

No ice was reported at the following stations during the period: Stettin, Gdansk, Klaipeda, Ventspils, Tallin, Helsinki, Mariehamn, Turku, Bredskar, Alnosund, Stockholm, Kalmar, Visby, Göteborg, Kiel, Tönning, Husum, Emden, Lübeck, Gluckstadt, Bremerhaven, Flensburg, Aarhus, Copenhagen, Oslo, Kristiansandfjord. No ice was reported at any of the stations during June

Station	April									May								
	Length of Season		Ice Days			Navigation Conditions			Accumulated Degree Days	Length of Season		Ice Days			Navigation Conditions			Accumulated Degree Days
	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I
Leningrad ..	1	16	6	0	0	6	0	0	1000	0	0	0	0	0	0	0	0	725
Riga ..	1	3	3	0	0	0	0	0	431	0	0	0	0	0	0	0	0	137
Pyarnu ..	1	14	14	4	10	0	14	0	647	0	0	0	0	0	0	0	0	284
Viborg ..	1	24	24	18	1	9	3	12	—	0	0	0	0	0	0	0	0	—
W. Norrskar	1	30	30	0	22	2	28	0	—	1	6	6	0	0	2	0	0	—
Mantyluoto	1	23	23	15	0	0	19	0	—	0	0	0	0	0	0	0	0	—
Vaasa ..	1	25	25	24	0	0	25	0	1169	0	0	0	0	0	0	0	0	999
Oulo ..	1	30	30	30	0	0	7	23	—	1	6	6	2	0	0	8	0	—
Roytaa ..	1	30	30	27	3	1	5	24	—	1	20	20	11	2	0	13	0	—
Lulea ..	1	30	30	30	0	0	7	23	1532	1	10	10	7	0	7	3	0	1403
Skellefteå ..	1	27	27	26	0	0	14	12	—	27	27	1	0	0	1	0	0	—

CODE:
A First day ice reported.
B Last day ice reported.
C No. of days that ice was reported.
D No. of days continuous land-fast ice.
E No. of days of pack-ice.
F No. of days dangerous to navigation, but assistance not required.
G No. of days assistance required.
H No. of days closed to navigation.
I Accumulated degree-days of air temperature (°C) where known.*

* These figures give a rough measure of the first probability of the formation of sea ice, and later the progress of the growth and its thickness. They are derived from daily averages of temperature (00 + 06 + 12 + 18 GMT) and are the sum of the number of the degrees Celsius below zero experienced each day during the period of sustained frost.

June

The atmospheric circulation during June was in almost complete contrast to that of the previous month. Pressure was much lower than usual over the central North Atlantic, particularly south of Iceland, but higher over northern Labrador and to the west of the Canadian Arctic Archipelago. It was unseasonably cold over much of eastern Canada, especially Newfoundland, and there was a significantly cool area to the east and north-east of Iceland. Otherwise temperatures were generally higher than usual and the large negative temperature anomaly experienced for many months over the east Greenland and Norwegian seas was greatly reduced under the influence of the enhanced south-westerly flow just to the south. Relatively warm conditions still persisted over the Beaufort Sea where, once again, the Trans-Arctic Expedition had difficulty struggling over rapidly-melting ice-fields.

Canadian Arctic Archipelago. The melting season was about 2 weeks ahead, with considerable openings in the pack, especially in Amundsen Gulf.

Hudson Bay. Much of the area remained comparatively warm except in the north-west of the Bay where there was an excess of ice.

Baffin Bay, Davis Strait and Labrador Sea. In Baffin Bay the ice was somewhat deficient, leads extending further north than usual along the Greenland coast, but there was an excess of ice to the south-west of Greenland and in the south of the Labrador Sea where a strong easterly drift of the ice was noticed.

Great Bank and Western Atlantic. Over the Great Bank there was an exceptional movement of icebergs and one was reported as far out as 45° 58′N, 41° 08′W, the furthest east since 1946 and about 170 miles beyond the average limit.

Greenland Sea and Spitsbergen area. There was a rapid retreat of the ice edge north of Iceland. At the beginning of the month the pack extended 100 miles further south-east than usual but, by the end of the period, any excess was small. Indeed, further north and across to Spitsbergen there was less ice than normal.

Barents Sea. Apart from the northern part where there was still an excess of ice, the area was milder than usual.

Other areas. Nowhere else was ice coverage much different from normal.

N. B. M.

Note. The notes in this article are based on information plotted on ice charts similar to the map shown opposite but on a much larger scale (39 × 27 in). These charts are published

at ten-day intervals and are available at the price of reproduction on application to the Director General, Meteorological Office (Met.O.1), Eastern Road, Bracknell, Berks. Alternatively, they may be seen at any Port Meteorological Office or Merchant Navy Agency. Up-to-date ice charts are broadcast daily by facsimile.

SPECIAL LONG-SERVICE AWARDS

This is the 21st successive year in which inscribed barographs are being awarded to each of the four voluntary marine observers whose long service, together with the quality of their observations over the years, is considered as deserving special recognition.

The minimum qualification for a special award is fixed at 15 years in which meteorological records bearing the officer's name, either as an observing officer or as master, have been received, including naturally the year previous to that in which the award is made. As soon as an officer's first meteorological logbook is received in the Marine Division, a personal card is started for him and thereafter a note is made on his card of his every subsequent meteorological logbook and the assessment awarded to it; we thus have a record of everything which an officer has ever done for us. Each year the record cards of all officers with 15 or more years' service are brought out and their overall record is worked out by our mathematical formula which takes into account the number of actual years observing together with the assessment which has been awarded to each individual meteorological logbook and this effectively places them in an order of merit, the top four being nominated for a special award. We have usually found that the 15 years of actual observing is spread over many more years, sometimes as many as 40, because service in ships which are not observing ships, service in a rank which does not participate in the work, time ashore for certificates, periods of lay-up, etc. will all preclude an officer from continuous observing but, so long as his name appears in every meteorological logbook which he sends us, he may be sure that each book is credited to him, no matter how long have been the gaps between them. In order, however, that this may be efficiently done, we require the full co-operation of the officer in giving us his full name, initials, and other particulars asked for on the inside back cover of the meteorological logbook, because officers of the same name are sometimes difficult to separate, especially if they have changed companies during their observing career.

This year there were 71 officers falling within the zone; the formula was applied to each one of their cards and as a result the Director-General of the Meteorological Office is pleased to award inscribed barographs to the following:

1. CAPTAIN J. R. M. RAMSAY (New Zealand Shipping Co. Ltd.) who sent us his first meteorological logbook in 1937 when he was in the *Essex*. In 19 years he has sent us 29 meteorological logbooks of which all but six have been classed 'Excellent'.
2. CAPTAIN W. H. STOODLEY (Bristol City Line), who first observed for us in the *Fort Brandon* in 1947. In 18 years Captain Stoodley has sent us 33 meteorological logbooks of which 29 have been classed 'Excellent'.
3. CAPTAIN H. GRAVELL (Hain-Nourse Ltd.), who sent us his first meteorological logbook in 1945 when he was in the *Empire MacDermott*; subsequently he has sent us, in 19 years, 45 meteorological logbooks of which 32 have been classed 'Excellent'.
4. CAPTAIN A. COOKSON (Manchester Liners Ltd.), whose first meteorological logbook came here from the *Manchester Shipper* in 1946; he has 20 years of voluntary observing to his credit and has sent us 44 meteorological logbooks of which 24 have been classed 'Excellent'.

We congratulate these four shipmasters on this recognition of their valuable

voluntary service for us over many years. They will be personally notified of the award and of the arrangements which will be made for its presentation.

An account of the presentation of the previous year's special awards appears on page 195 of this issue.

L. B. P.

AUSTRALIAN EXCELLENCE AWARDS

(From the Director of Meteorology, Australian Bureau of Meteorology)

The following ships and ships' officers were selected to receive Excellence Awards for 1966.

SHIP AWARDS

m.v. *Arafura*, Eastern and Australian S.S. Co.
m.v. *Koojarra*, Western Australian State Shipping Service.
m.v. *Rhexenor*, Blue Funnel Line (Aust.) Pty. Ltd.

PERSONAL AWARDS

Captain J. F. Scott	m.v. *Kooringa*, Associated S.S. Pty. Ltd.
Captain B. Dunn	m.v. *Aramac*, Eastern & Australian S.S. Co. Ltd.
Captain Brett-Hilder	m.v. *Bulolo*, Burns Philp & Co. Ltd.
Captain J. Harrison	m.v. *Mundoora*, Associated Steamships Pty. Ltd.
Captain C. W. Leadbetter	m.v. *Bamora*, British India S.N. Co. Ltd.
Mr. E. Kaske	2nd Officer, m.v. *Delos*, Wilhelmsen Agency Pty. Ltd.
Mr. M. Bremner	3rd Officer, m.v. *Bass Trader*, Australian Line
Mr R. Choy	Radio Officer, m.v. *Papuan Chief*, China Navigation Co. Ltd.
Mr. R. Pollard-White	Radio Officer, m.v. *Koojarra*, Western Australian State Shipping Service

Photographs of the presentations to m.v. *Rhexenor* and to Captain J. F. Scott appear opposite page 193.

CANADIAN EXCELLENT AWARDS

(The following statement has been received from the Director of the Canadian Meteorological Branch)

The winners of the annual Canadian Excellent Awards for marine weather observing in 1967 have been announced and are listed on page 202.

Fifty-three awards in the form of suitably inscribed books, detailed below, have been presented to the Captains, Principal Observing Officers and Radio Officers of ocean-going voluntary observing vessels.

Twenty-five books were presented as 'Ship Awards' to vessels which have returned the best logbooks in regard to both quality and quantities in 1967. The books chosen for this award were *The Ship—An Illustrated History*, by Bjørn Landstrøm, or *The Colour of Canada*, by Hugh MacLennan. This award was for group achievement and is placed in the ship's library for all to enjoy.

The best 13 Principal Observing Officers received the National Geographic Society's *Atlas of the World* for their individual efforts.

Fifteen Radio Officers received the book *Gypsy Moth Circles the World*, by Sir Francis Chichester, for transmitting the greatest number of weather observations.

The Canadian Meteorological Branch congratulates the award-winning ships and officers and extend their thanks for the splendid work done by all the officers of the voluntary observing fleet.

Recipients of Canadian Excellent Awards—1967

Name of Vessel	Captain(s)	Principal Observing Officers	Radio Officer	Owner/Agent
Acadia	J. W. C. Taylor	F. W. Sheppard	J. E. Furness	Government of Canada
Baffin	P. M. Brick	—	A. K. Fearon	Government of Canada
Banario	T. B. Riches	V. K. Y. Wei	—	Johnson Walton S.S. Ltd.
Bluenose	—	D. Vail, H. Whitehead	—	Government of Canada
Bridgepool	F. A. Carter, F. D. Lloyd	—	—	Pacific Export Line Ltd.
Canberra	E. G. H. Riddelsdell, J. L. Dunkley	J. H. Booth	R. Hawkins	P. & O. Lines Management Ltd.
Cygnus	R. W. Townsend	M. C. Blagdon	—	Government of Canada
d'Iberville	—	—	E. R. Bonneau	Government of Canada
Droxford	W. A. Ross	A. R. Pope	C. B. Smith	Risdon Beazley Ltd.
Emerillon	C. Bradshaw, J. C. Lough, I. Balodis	A. J. C. Gair	—	Shell Canada Ltd.
General Guisan	F. Adessi	—	—	Anglo Canadian Shipping Co. Ltd.
Gypsum Countess	R. T. Luckey, R. Koppel	—	C. Orchard	Fundy Gypsum Co. Ltd.
Gypsum Prince	N. Crowe, M. J. Kerley	P. J. Griffin	K. T. Burrows	Fundy Gypsum Co. Ltd.
Gypsum Queen	J. R. Blinn, O. Langdon	—	K. T. Burrows, T. E. Potts	Fundy Gypsum Co. Ltd.
H 1070	J. Harding, J. Munro	—	—	Engineering Consultants Ltd.
Harengus	—	E. Fevens	—	Fisheries Research Board of Canada
Hudson	W. N. Kettle	—	F. A. Webb	Government of Canada
Imperial St. Lawrence	J. C. Matthews, C. H. Ritcey	—	F. des Roches	Imperial Oil Ltd.
Inverleith	D. S. Archibald	—	—	Chr. Salvesen & Co. Ltd.
Ixia	G. W. Mortimer	—	—	Stag Line Ltd.
John A. Macdonald	—	—	N. T. Kristensen	Government of Canada
Kapuskasing	—	—	G. A. Rayne	Government of Canada
Mimosa	A. Johansson, R. Claeson	—	—	North Pacific Shipping Co. Ltd.
M. J. Boylen	—	—	D. Keating	Canadian General Electric Co. Ltd.
Narwhal	M. C. Lever	—	—	Government of Canada
Nybella	O. Rebnor	—	—	Pan American Oil Co.
Oriana	C. Edgecombe	R. L. Jackson	E. R. LeGear	P. & O. Lines Management Ltd.
Princess of Acadia	J. A. Blinn	P. Petrovitch	W. E. Fontaine	Canadian Pacific Railways
Queen of Prince Rupert	J. D. Callan, T. Parkinson	—	—	British Columbia Ferry Authority
Simandou	R. W. Jones	—	—	Seaboard Shipping Co. Ltd.
Sir Humphrey Gilbert	—	D. Daly	—	Government of Canada
Thorstream	T. Lund, L. Ormestad	—	—	A/S Thor Dahl

Book Reviews

A History of Nautical Astronomy, by Charles H. Cotter, B.Sc. $8\frac{3}{4}$ in × $5\frac{1}{2}$ in, pp. xii + 387, *illus.* Hollis and Carter Ltd., 9 Bow Street, London W.C.2, 1968. Price: 63*s.*

The author is no stranger to *The Marine Observer*; the reviews of some of his earlier books which have appeared herein are evidence that he is very well qualified to write on any aspect of marine navigation in an interesting and informative way. In this new book he does not disappoint us.

The preface, by a former President of the United States Institute of Navigation, when discussing the value of this book, ends with the words "As a repository of cultural information on man's emergence as a master of his environment, it is a worthy addition to any gentleman's library". In this reviewer's opinion this is a fair comment—but this book is more than a history, it contains a wealth of intriguing calculations and nautical astronomy drawings, mostly drawn on the plane of the observer's celestial horizon, which are easily understandable by any practical navigator and which should help him to understand a little more about the theory of navigation. The calculations might also help him to understand why juggling with trigonometrical identities is a feature of the Board of Trade examinations!

His previous books have shown how thorough the author is and this book is no exception; he manages to go into an enormous amount of detailed study and yet, by his economical use of words, does not make the book appear 'heavy'.

The history of navigation is a vast subject; in fact the author reminds us that astronomy "is a branch of knowledge probably as old as mankind itself" and he was a plucky man to tackle it. From the navigational viewpoint he takes us back to the twelfth century B.C. and brings us up to the present day. The text is almost entirely devoted to the problem of finding one's latitude and longitude; the only instruments that are discussed are those for measuring altitude and time.

A study of this book will surely make the modern navigator feel a little humble when he realizes the appalling problems that his ancestors had to put up with in trying to find their position at sea. The 50 or so pages which discuss the complicated business of longitude by lunar distance almost make one's hair stand on end. And we realize what a debt the navigator owes to Harrison and his chronometer and to Captain Sumner who was the originator, in 1837, of position-line navigation. We are told that Sumner's discovery was "something of an accident" and occurred when approaching the Smalls from the south-west when he got a single observation of the sun. It was Marcq St. Hilaire, however, who seems to be the man to whom the modern navigator owes the most for his simplification of position-line navigation by the intercept (or point rapproché) method.

Obviously a navigator could not do much without a nautical almanac and various navigation tables; a whole chapter is devoted to these with frequent reference to them in the general text. The familiar names of Davis, Burdwood, Norie and de Aquino figure prominently.

On reading this book one cannot fail to be impressed with the enterprise shown by sea-going officers, who are not, as a class, mathematically minded, in improving the practice of navigation.

The two Appendices entitled "Spherical Astronomy" and "Spherical Trigonometry" condense into very few pages a valuable summary of these subjects. The book ends with a complete bibliography containing 375 items.

C. E. N. F.

Yacht Master Coastal, by P. Clissold and C. W. Roberts. 9 in × $5\frac{3}{4}$ in, pp. 211 + xvi, *illus.* Brown, Son & Ferguson, Ltd., Glasgow, 1968. Price: 52*s.*

As stated in the preface, this book is designed especially to cover (and is confined

to) the requirements for the written part of the examination for the B. of T. Yacht Master (Coastal) Certificate. Mathematics have been reduced to a minimum.

The authors, as lecturers at the School of Navigation, Warsash, for many years, must be well known to many readers of this journal. With their practical knowledge of the subject and familiarity with Board of Trade examination requirements they are well qualified to have written this treatise.

The book is in four parts each dealing with one paper of the written examination. Part I covers both chart work and pilotage, in addition to navigation which is a separate paper in the examination. Part II deals with magnetism and the magnetic compass, and Part III meteorology. The examination regulations, syllabus and a list of ports where the sight test which candidates are required to pass before taking the examination, as well as a specimen set of examination papers, are included as appendices. The inclusion of examination papers on each subject will be appreciated by those preparing for the examination. The necessary nautical ephemeris and tables required to work the problems in navigation, together with the codes and decode required for some of the meteorological papers, are provided; also a reproduction of a portion of the chart of the English Channel for use with the exercises in chart work, and a copy of Admiralty Chart No. 5011 (explanation of symbols and abbreviations used on Admiralty charts).

Several errors in meteorological codes have escaped the proof-reader and the price of the H.M.S.O. publication *Meteorology for Mariners* as one of the books recommended in the preface for further reading, given as 20*s*., is in fact now 32*s*. 6*d*. Apart from these minor errors the book is well produced and will no doubt be welcomed by those preparing for the B. of T. examination.

A. D. W.

Personalities

RETIREMENT—Captain J. Treasure Jones retired at the end of August 1968 after 47 years at sea.

John Treasure Jones was born at Haverfordwest in 1905 of seafaring stock. His maternal grandfather and three maternal uncles were master mariners square-rigged; one uncle, Captain J. W. Williams, became marine superintendent of the White Star and Cunard-White Star Lines.

Young Jones was educated at Haverfordwest Grammar School and signed indentures with Messrs. J. C. Gould of Cardiff; his first ship was their *Grelgant* which he joined in June 1921. After putting in the necessary sea time, he joined the Royal Naval Reserve as a probationary midshipman and, on completion of his indentures, did his 6-months' Naval training in H.M.S. *Hood*.

After passing for 2nd Mate he entered the service of Messrs. Hall Bros. of Newcastle and joined their *Ambassador* in March 1926 as 3rd Officer. After passing for Mate early in 1927 he returned to them as 2nd Officer of their *Caduceus*. He passed for Master in June 1929, spent about two years in Alfred Holt's and in 1936 joined the Cunard-White Star Line where he was to remain for the next 32 years.

At the beginning of World War II Captain Jones was called up for service in the Royal Navy and appointed navigating officer of H.M.S. *Laurentic*, a Cunard-White Star vessel which had been requisitioned and converted to an armed Merchant Cruiser. In this ship he was torpedoed in November 1940.

He was then appointed to command H.M.S. *Sunflower*, a 'Flower' class corvette, and later became group commander of the 39th escort group in the Mediterranean. He was twice mentioned in despatches and finished the war as Divisional Sea Transport Officer in the Dutch East Indies.

After the war Captain Jones returned to the Cunard and was appointed to his first command with them, the *Vandalia* in 1953; his first passenger ship command was the *Media* which he took in 1957 and his last was the *Queen Mary*. In a recent letter he told us that he was proud and pleased to be the last captain of the *Queen*

Mary and that his seagoing career ended with hers. He had been promoted to Captain R.N.R. in 1949 and retired from the Reserve in 1960.

Captain Treasure Jones is an honorary member of the Panama Canal Pilots Association and an honorary Pilot of Long Beach, California, as well as being a life member of the Long Beach Chamber of Commerce. Coming nearer home, he is a member of the Honourable Company of Master Mariners and an honorary Rotarian of the Haverfordwest Rotary Club. In April 1968 he was honoured by the University of Wales in having the honorary degree of LL.D. conferred on him.

Captain Treasure Jones's association with the Meteorological Office goes back to 1936 when he sent us three meteorological logbooks from Alfred Holt's *Rhexenor*. Altogether, in 14 years of active observing spread over 9 different ships, he sent in 40 logbooks, 26 of which were classed Excellent.

We wish him health and happiness in his retirement.

L. B. P.

Notices to Marine Observers

1st JANUARY 1969—INTRODUCTION OF $1T_wT_wT_wt_T$

As from 1st January 1969 all observing officers are asked to include the group $1T_wT_wT_wt_T$ (group 13) in their observations. The figure 1 is a permanent indicator, $T_wT_wT_w$ is the sea temperature in degrees and tenths, and t_T is the decimal figure of the AIR temperature. By including this group in the message there will be no need to report the air-sea temperature difference, so group 12 may be reported as $0//T_dT_d$. Also, by reporting the air temperature in tenths (TT and t_T), it will not be necessary to round off TT (in the group PPPTT) to a whole number.

FREETOWN—DELETION FROM LIST OF STATIONS

Freetown (9LL) has now been officially deleted from the list of stations accepting radio weather messages. Observing and radio officers are reminded that other stations serving the West African area remain operational.

NAUTICAL OFFICERS AND AGENTS OF THE MARINE BRANCH OF THE METEOROLOGICAL OFFICE, GREAT BRITAIN

Headquarters.—Commander C. E. N. Frankcom, O.B.E., R.D., R.N.R., Marine Superintendent, Meteorological Office (Met.O.1.), Eastern Road, Bracknell, Berks. (Telephone: Bracknell 20242, ext. 456.)
Captain A. D. White, R.D., Lt.-Cdr. R.N.R., Deputy Marine Superintendent. (Telephone: Bracknell 20242, ext. 543.)
Lieut.-Commander L. B. Philpott, D.S.C., R.D., R.N.R., Nautical Officer. (Telephone: Bracknell 20242, ext. 461.)

Mersey.—Lieut.-Commander E. R. Pullan, R.D., R.N.R., Port Meteorological Officer, Room 709, Royal Liver Building, Liverpool 3. (Telephone: 051–236 6565.)

Thames.—Mr. J. C. Matheson, Master Mariner, Port Meteorological Officer, Movement Control Building, South Side, Victoria Dock, London, E.16. (Telephone: 01-476 3931.)

Bristol Channel.—Captain F. G. C. Jones, Port Meteorological Officer, 2 Bute Crescent, Cardiff CF1 6AN. (Telephone: Cardiff 21423.)

Humber.—Mr. W. G. Cullen, Port Meteorological Officer, c/o Principal Officer, Board of Trade, Trinity House Yard, Hull. (Telephone: Hull Central 36813.)

Clyde.—Captain R. Reid, Port Meteorological Officer, 118 Waterloo Street, Glasgow, C.2. (Telephone: Glasgow City 4379.)

Forth.—All enquiries to Captain Reid above.

Tyne.—Captain C. J. D. Sutherland, Merchant Navy Agent, c/o F. B. West & Co., Custom House Chambers, Quayside, Newcastle upon Tyne. (Telephone: Newcastle 23203.)

Southampton.—Mr. A. C. Howie, Master Mariner, Merchant Navy Agent, Southampton Weather Centre, 160 High Street below Bar, Southampton. (Telephone: Southampton 20632.)

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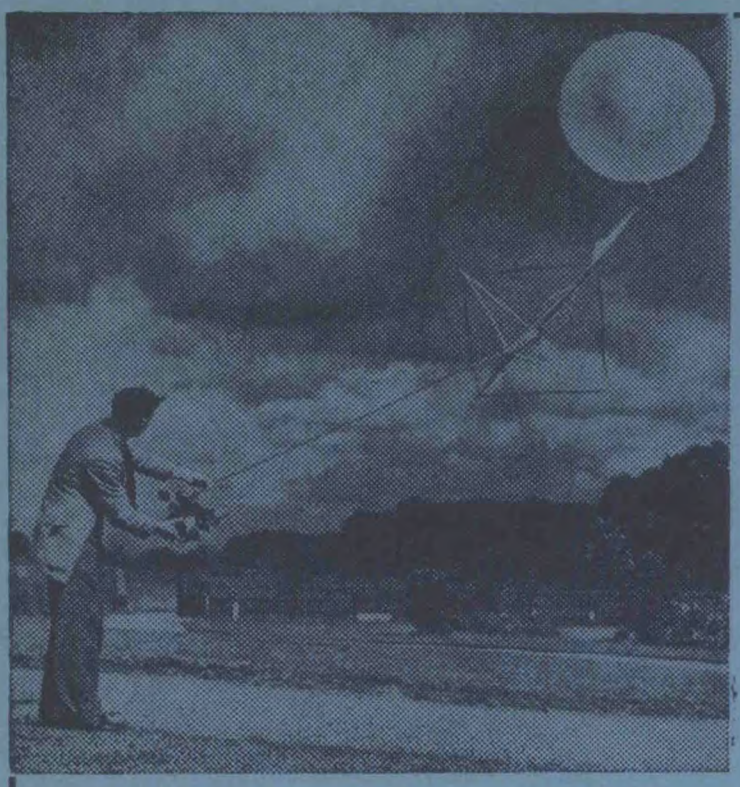
Printed in England for Her Majesty's Stationery Office by
William Clowes and Sons Ltd., London and Beccles

Dd. 137764. K.16. 9/68



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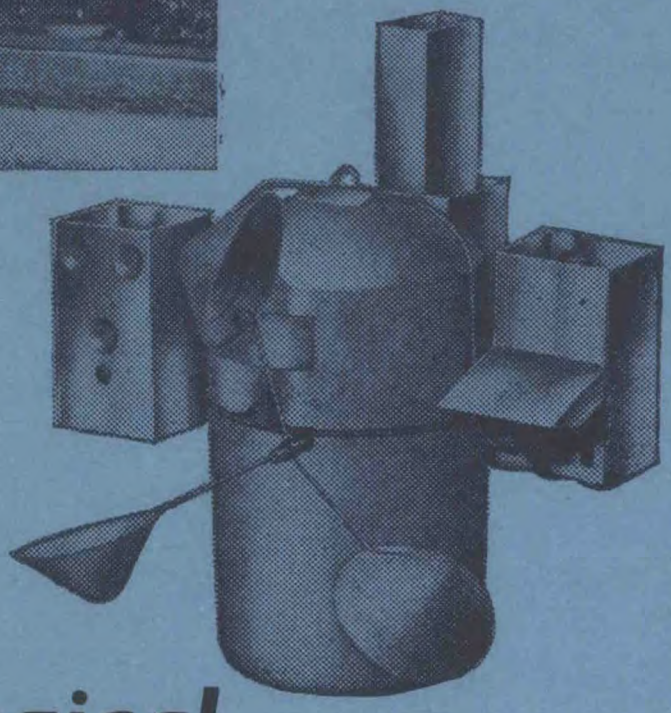

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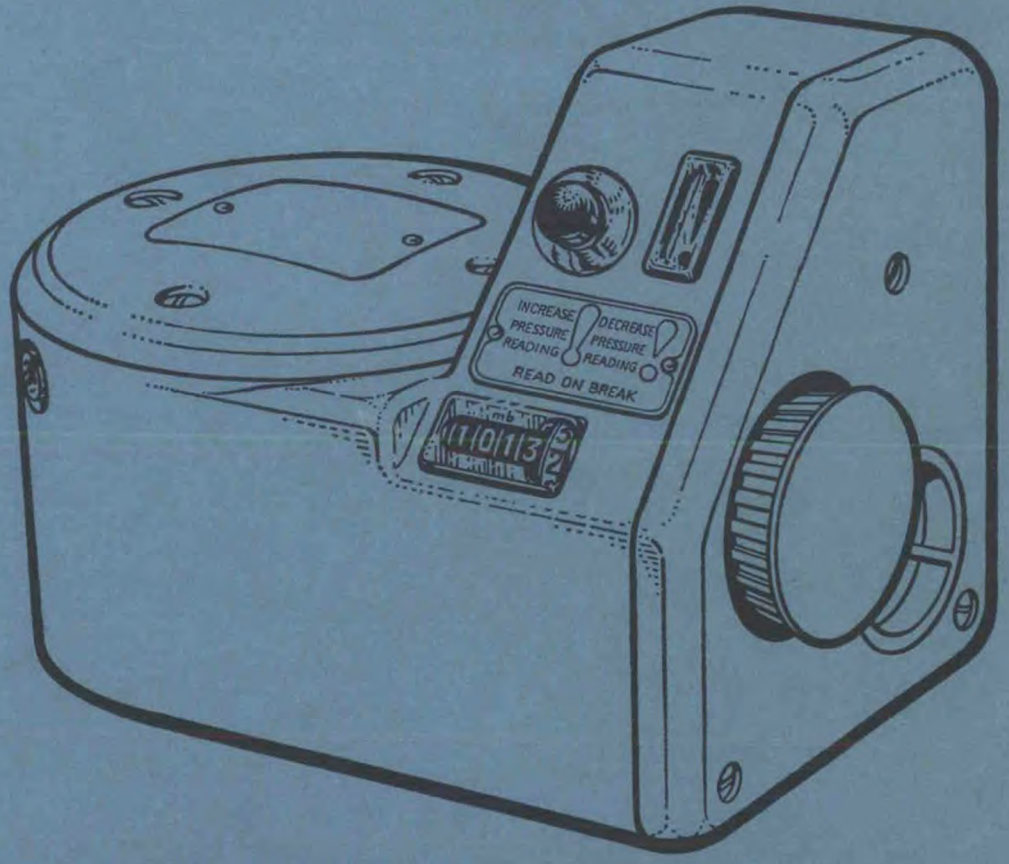

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